

CHEMICAL MARKETS

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Sales Expenses

MORE chemical consumers have changed their source of supply during the past six months than during all the six years just past. This is the natural consequence of broken prices and sharp competition. This switching of customers contains a threat and creates an opportunity, both of which are extremely pertinent to any consideration of selling costs.

IT IS obviously good theory, when business is difficult to close, to put a little extra pressure on sales. Curiously, it is quite obviously the practice of many chemical companies to curtail sales expenses even more promptly than to cut production or to institute plant economies in personnel, in methods, or in equipment. Because it is easier to effect sales savings does not, however, justify what is too often a false economy.

THIS is no plea for the fancy trimmings of chemical salesmanship. Many of these are luxuries with which we might well dispense right now. Much that has characterized the "up town movement" of the New York offices of our chemical

companies—the walnut desk in panelled office; the intricate statistical and record keeping machinery; the reception clerks, engraved stationery, and private secretaries for all but the cub salesman who covers Hoboken and Weehawken—much of this sort of thing seems incompatible with how chemicals are sold and why. Yet this is not the direction which we notice sales economy taking. Cut down the selling staff. Two trips through that territory instead of three. Ten per cent off the advertising budget. A resignation from this trade association and one man instead of two to attend that trade convention. These are the most popular ways and means of cutting sales expenses.

THE logic is difficult to follow. Every method of proved result; every contact of known value; every tested policy and every trained man ought today to be put to work overtime, for, whatever may be the final outcome of the broad economic readjustment through which we are passing, the position of the individual company five years from now will depend not a little upon the ability of its sales department to win a new place in new markets.



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Romance and color portray these states, whose fabulous wealth lured even the earliest explorers.

Gold, in the earth and in the landscape . . . fruit and flowers spread in abundance . . . grain fields, water power, fisheries . . . there is no limit to the natural bounty which underlies an astounding industrial growth in the Pacific States.

"American" Alcohol, with convenient plants, takes a part in this rapid growth.

//
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AMERICAN
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BUYING the best raw materials obtainable makes an excellent "first step" toward achieving a reputation for quality products.

"American" Alcohol is a high-standard raw material . . . with adequate proof of its purity in the exceptional clearness, and lack of color and odor.



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Birmingham, Ala.	Cleveland, Ohio	Indianapolis, Ind.	Nashville, Tenn.	Philadelphia, Pa.	San Francisco, Cal.
Boston, Mass.	Detroit, Mich.	Kansas City, Mo.	New York, N. Y.	Pittsburgh, Pa.	Toledo, Ohio
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Hoover on Business President Hoover's splendid message vetoing the "Norris Muscle Shoals Bill" was weakened by the alternate proposal suggesting that the States of Tennessee and Alabama should attempt operation of the plant. Seemingly, he lacked the necessary frankness required to tell the public that the money invested in the so-called fertilizer plants is just so much water over the dam. It is money lost, lost in a good cause, just as the money in ships was money spent to win a war, and considered only as such. Except for political purposes the nitrate plants at Muscle Shoals are junk and nothing more.

However, it is refreshing amid so many befuddled notions concerning what should be the American relationship between business and government to have the President plainly inform the Congress that, "I am firmly opposed to the Government entering into any business the major purpose of which is competition with our citizens." This is a clear-cut declaration of a principle that is a pillar supporting American ideas of personal rights and free economic opportunity.

Likewise, it is satisfying to hear at least one man in public office with sufficient business insight to understand that, "No chemical industry with its constantly changing technology and equipment, its intricate problems of sales and distribution, can be successfully conducted by the government."

Agitation over Muscle Shoals is not permanently defeated by any means, nor is the question merely one of its operation by the government. Fertilizer made by the government means power sold by the government. For this reason we are wholly in accord with the President when he says, "I hesitate to contemplate the future of our institutions, of our government, and of our country if the preoccupation of its officials is to be no longer the promotion of justice and equal opportunity but is to be devoted to barter in the markets. That is not liberalism, it is degeneration."

Protection vs. Expectation That period which the *Financial Chronicle* aptly designates as "the Blessed Interlude" is now upon us. By the inexorable working of our Constitution we will be without the federal legislature for nine months—a longer period of relief than has occurred in several years. This has evoked smart witticisms and many cartoons, but there is a more serious side to joy over the passing of Congress. The legislative branch of our government has

been looked upon with increasing disfavor by business men for many years. By its own record Congress has shown again and again that it little appreciates our common economic problems and quite often its contribution has been open hostility and obstruction. The last Congress has done absolutely nothing of a constructive nature that would alter this feeling. In fact, in a number of ways its record is several degrees worse than any of its predecessors'. That the United States Government is not now a chemical manufacturer, in open competition with private producers, is thanks to but two or three senators changing their vote at the last minute under the whip of party expediency.

Business now has a golden opportunity to prove its ability to recuperate solely by its own efforts. Congress has struggled with the problem in vain. The sum total of the last congressional effort is the bonus bill, farm relief, drought relief, all political measures designed for political consumption without a serious economic thought in any part of them. Should business accomplish this feat within the time limit provided by the law of the land it will demonstrate vividly the fallacy of running to Washington about every problem that arises. Conversely, if we should fail, it will strengthen the belief cherished by many of our citizens that the economic structure of the country should be rebuilt upon Russian or Italian specifications, and that the chief function of Government should be revised from protection of the rights and liberties of all our citizens to the exploitation of a few for the benefit of the many.

Exports Balance Imports One of the very few encouragements of 1930 has just come to light with the announcement by the Department of Commerce that for the first time in many years American exports of chemicals and allied products balanced our imports. Since 1921, chemical exports have advanced fifty-six per cent, from \$110,000,000 to \$172,000,000 and imports only thirty-three per cent, from \$129,000,000 to \$172,000,000. Thus, despite minor fluctuations, the definite trend has been towards an equalization between the two trades. It is pleasant to note that our chemical exports for 1930 were well above the average for the ten year period.

We may look with satisfaction on this record. These figures, somewhat dry of themselves, represent our emancipation from foreign dependence in many chemical lines of

first importance. Further, they carry the message that this country is now very definitely a factor in the international field of industrial chemicals.

Contrarywise, a few of the leading imports present some interesting thoughts for us to dwell upon. Throughout the ten year period sodium nitrate has been the leading single item, but its proportion to the total import has shifted from twenty-six per cent in 1925 to twelve per cent in 1930. Imports of \$21,417,000 (568,000 tons) were the lowest since 1922. We are making real progress in nitrogen fixation. When we come to muriate of potash the story is quite reversed. This is the third leading item in our imports, and the peak figures were reached in 1930. Tung oil was our second largest import, interesting in the light of the present experiments in Florida. Creosote oil is fourth, but indications are that we are rapidly approaching a point where we will supply the major portion of our needs. In the dye field, our exports exceeded our imports by a million dollars. In the shellac field we are still, of course, very much dependent upon foreign sources of supply.

The leading items among our exports are lacquers, acetone, insecticides and disinfectants, plastic materials, benzol, and phosphate rock. Clearly manufactured products are a larger and larger proportion of our exports. In the industrial chemical field, besides acetone and benzol, carbon black, calcium chloride, borax and the alkalies made the most impressive showing. Sulfur, one of our most important exports, was somewhat below the normal for the 1926-1930 average. Bleaching powder has shown the largest decline, and methanol and acetate of lime are likewise falling off.

Unquestionably, the favorable position of the chemical industry in 1930, when comparison is had with other industries, has been helped by the backlog of export business. As time goes on the foreign field becomes more important. We are definitely committed to international competition in the countries of the world whether we appreciate the fact at the moment or not.

Quotation Marks

No policy involving selling should ever become static. If it shows the slightest tendency to settle into a fixed attitude or to acquire a mossy tinge, it is out of touch with merchandising progress and should be re-analyzed and rebuilt from the markets inward.—J. H. Donohue, *Printers' Ink*.

A real executive is one who can get others to do their work properly. Therefore, it follows, that without the ability to unfailingly exercise good judgment in the selection of men, no one can obtain the fullest measure of commercial success.—*American Dyestuffs Reporter*.

If a manufacturer is one of those fussy Victorian individuals who refuse to accept orders below cost, it would seem rather important that he know what his cost is.

If, on the other hand, he belongs to the group of serious thinkers who believe it is cheaper to accept orders below cost than to curtail, he might be expected to be mildly interested in the extent of the loss involved in accepting those orders.

Moral: Whether you are making or losing money, accurate cost methods are handy things to have around the mill.—*Textile World*.

That conditions will improve in the very near future we all know, as this has always been the case when similar slack times have occurred, and if the average plant should be modernized at the present time, it could turn out the largest possible tonnage at the lowest possible cost when orders come. The low cost of this work if done at the present time would make a tremendous saving for the company.—*Paper Industry*.

"The fertilizer companies are hard-boiled so far as depression is concerned," said an official of a leading plant food company recently. "We have gone through the blackest years in the industry in the last decade, and we are not out of the woods yet. We have learned to cut expenses to a minimum. There are no highly paid officials in any job, and every man earns his keep. One of these days the business will come back, and then we shall be ready to reap the benefits."—*Wall Street Journal*.

There has been an epidemic of criticisms, many of them fabrications far from the truth, spread abroad in the daily newspapers and the popular press in an effort to discredit the use of methanol as an anti-freeze on the ground of public danger.

Frankly, we do not like to see such conduct in the chemical business.—*Chemical and Metallurgical Engineering*.

Fifteen Years Ago

(From our issues of April, 1916)

Dow Chemical Co. declares a special dividend in cash of 20 per cent on the \$1,500,000 outstanding common stock.

Carbolic acid declines as production increases.

Joseph Morningstar dies in his fifty-seventh year.

Dupont interests offer to construct \$20,000,000 plant for the manufacture of nitrates in exchange for certain free water rights. Carpenter Chemical Co. pays 8 per cent dividend.

Germany agrees to ship 15,000 tons of dyes to this country to relieve serious shortage.

Eimer & Amend plan the erection of a 10 story addition.

What are the Future Trends In the American Synthetic Yarn Industry ?

By Charles E. Mullin, D. Sc.*

THE term synthetic yarns includes all types of the man-made fibers and yarns which were at one time called artificial silks. Later these yarns and fabrics were more or less commonly known as rayons. More recently the name rayon has been particularly applied to yarns and fabrics made by the viscose process, which supplies about 85 per cent of the world's total production of synthetic yarns.

The manufacture of the synthetic yarns is rapidly becoming one of the most important branches of two major industries in the United States, i. e., the chemical and the textile industries. The growth of this industry since the war has been tremendous, specially during the last few years, probably exceeding that of any other branch of either of the two major industries mentioned.

At the present time the United States is producing about one-third of the synthetic yarn made in the world. This is almost as much as that made in the next three largest producing countries combined, that is, Italy, England and Germany. Although only about half of the producing plants are located south of the Mason and Dixon line, these southern plants produce more than twice as much yarn as those located in the North.

Different Manufacturing Processes Used

There are now four quite different general processes in use for the manufacture of the synthetic yarns and all of these are used in the United States. While these processes resemble each other more or less in a general way, they differ from each other quite widely as to the

*Professor of Chemistry, Rayon and Dyeing. Head of the Division of Textile Chemistry, Clemson College, S. C.



Interior of a viscose rayon spinning room showing the bobbin type of spinning machinery in operation, and the ventilating hoods to carry off the fumes. Courtesy Oscar Kohorn & Co.

exact details of procedure. The four processes in general use are as follows:

1. The cellulose nitrate process, used in producing Tubize yarn.
2. The cuprammonium process, giving Bemberg yarn.
3. The viscose process, used for viscose yarn or rayon.
4. The cellulose acetate process, giving Celanese brand yarn.

The same raw material, cellulose, is used in all of the

four processes of manufacture and, theoretically at least, almost any source of cellulose can be used for this purpose. In practice it has been proven that the cellulose from all sources is not equally suitable for the manufacture of synthetic yarns and in America only purified cellulose from cotton linters and wood pulp is used.

In each process of manufacture the natural cellulose (cotton linters) is well purified by boiling with caustic soda solution under pressure in closed kiers, followed by bleaching with sodium hypochlorite solution. During the latter process it is also beaten in a hollander to give shorter fibers, in much the same manner as in the manufacture of paper. The purified cellulose is then treated by a special process so as to bring it into solution, or to render it soluble in certain solvents. The various methods by which the cellulose is brought into solution form the major differences in the various processes of synthetic yarn manufacture.

In each different process of manufacture, this cellulose solution is spun to give the actual filaments, which when collected and twisted together form the thread or yarn. In each of the spinning processes the cellulose solution is forced through fine holes, usually in a small metal plate called a spinneret, into a liquid or air which neutralizes or removes the solvent and

coagulates or precipitates the cellulose filaments. In most processes the spinnerets have many fine holes, the exact number of which varies with the number of filaments desired in the yarn, and the filaments from each spinneret are collected and twisted together to form a single thread. In the pot spinning process, so widely used in the manufacture of rayon by the viscose process, this twisting proceeds simultaneously with the collecting of the filaments. In the bobbin spinning process the filaments are twisted by a separate and special process after spinning.

It should be understood, of course, that the above is merely a very brief outline of the general process by which all of these yarns are manufactured. The exact details of each process varying widely from those of the other processes. Roughly these steps may be summarized as follows:

1. Purification and bleaching of the crude cellulose.
2. Solution of the cellulose by various chemical processes.
3. Ageing or ripening of the cellulose solution. (Viscose process only).
4. Filtration and deaeration.
5. Actual spinning of the cellulose solution.
6. Twisting together of the individual filaments to form the yarn.
7. Removal of impurities or other undesirable chemicals from the yarn. (In all processes except the acetate process).
8. Bleaching, washing, oiling, drying, inspecting and winding the yarn.

Statistics

At present there are about thirty synthetic yarn plants in the United States, as compared with about nineteen in 1927, and fourteen in 1925. As shown in Table IV, these plants manufactured 130,369,000 pounds of synthetic yarn in 1930, and it is estimated that they will produce about 174,360,000 pounds of yarn in 1931, an increase of more than 33 per cent over 1930. The production in 1927 was 75,555,439 pounds, valued at \$106,468,752.00; and the 51,902,491 pounds produced in 1925 were valued at \$88,007,873.00.

In 1925 the price of 150 denier, first quality yarn was \$2.00 a pound, but by 1927 this price had dropped to \$1.50 per pound. During the first six months of 1930, the price of this same yarn that sold for \$2.00 a pound in 1925, but of much improved quality, was only \$1.15 a pound, and during the last half of 1930 the price was only 95 cents per pound. At the

present time the price is only 75 cents per pound, but this is undoubtedly a specially low price which may be more or less temporary, probably due to a price war or other unusual conditions. But what other industrial commodity can show as great reduction in price, with as many concurrent improvements in quality, in a five year period? On the basis of the above statistics, the 1930 American synthetic yarn production was probably worth about \$137,000,000.00, and that for 1931 may be worth about \$140,000,000.00, if the production reaches expectations. On the basis of the 20,000 employees in 1925, and 27,000 in 1927, and considering the increased efficiency during the three year period, there may have been about 37,000 to 40,000 employees in this industry in 1930, and this may reach some 45,000 during 1931, if the 175,000,000 pounds estimated production is reached.

Knowing that these workers received in wages and salaries in 1925 about \$25,500,000.00, and in 1927 about \$32,600,000.00, we may assume that the increased number in 1930 received about \$45,000,000.00, and the increased number in 1931, about \$50,000,000.00, if wages are not reduced.

The Saturation Point and Research

At various times in the past there has been a feeling that the maximum consumption or saturation point for the synthetic yarns was rapidly approaching. However, it should be pointed out that even in 1930 the world's total production of these fibers was only about three per cent of that of the natural fibers.

Without the numerous and very remarkable improvements and developments in both the quality and cost of these manufactured fibers, in which both the chemist and chemical engineer have played such important parts, undoubtedly the saturation point would have been reached long ago. The demand today in America for the synthetic yarns is not for the cheapest products, but for the best that can be produced. This is just as it should be and every progressive manufacturer recognizes this fact. Every new improvement in either the quality or cost of these yarns opens up many new uses and outlets for their products. Therefore, the interest in research upon all phases of synthetic yarn production is continuing.

Although the developments and improvements in the manufacture, quality and cost of the synthetic yarns during the past have been tremendous, the

POST WAR INDUSTRIES

Artificial yarns, plastics, and lacquers are three outstanding chemical accomplishments of the last decade. But what of the future? Will their growth, halted by temporary business conditions, resume at the rapid pace of the last few years? As large consumers of industrial chemicals the future of the heavy chemical industry is dependent to a great extent on the further expansion of these three industries.

Dr. Charles E. Mullin, leading textile chemist of the South, explains in this and a second article, the present status of the synthetic yarn industry in America, the present methods of manufacture and the probable channels of further growth. Similar studies of the plastics and lacquer industries will be announced at a later date.

developments and changes taking place today are even greater than ever before in its history. Every advance in this field has been—and is—founded entirely upon research. Most of this research has been in either strictly chemical or chemical engineering fields. As compared to the wonderful progress in this industry, the rest of the textile industry has been standing still, rooted in its own ignorance in the fundamentals involved in almost every step of its manufacturing processes.

The Future of the Synthetic Yarns

The synthetic yarn industry of the world is today only about forty years old, and that of America about twenty years old. During the past five years, in spite of all of the remarkable improvements in quality, the price of this yarn has decreased from \$2.00 to \$0.75, a drop of 62.5 per cent in five years. Can anyone doubt the future of such an industry? The present slump in the synthetic yarn, and all other industries, is the first really serious setback ever experienced by this industry. Naturally, some of those connected with the synthetic yarn industry have become somewhat pessimistic but, fortunately, this is not the general consensus of opinion. "Sweet are the uses of adversity" and they will undoubtedly serve to even further strengthen and fortify the synthetic yarn industry of the world.

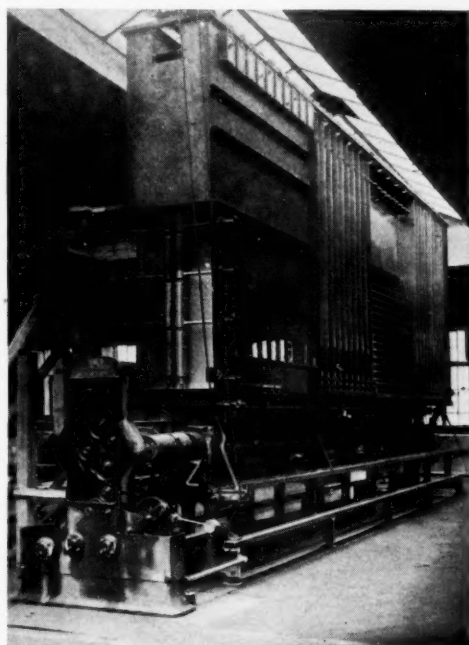
Synthetic yarn is the one fiber where the production is under the absolute control of man. In the production of all of the natural fibers capricious nature is the controlling factor. During the past few years the tendency towards mergers and consolidations in the synthetic yarn industry has probably been greater than in any other industry. Of course this tends to place the control of synthetic yarn production largely in the hands of a few very large companies. These

factors pretty well insure that the selling price of the synthetic yarns will never go below the cost of production for any long period of time, and this is a very important point for investors.

Every drop in the price of any variety of synthetic yarn, and every improvement in quality, opens up many new fields for their utilization. Every new use brings an increased demand and production. At the present time it is probably costing between \$0.60 and \$0.70 a pound to produce 150 denier yarn by the viscose process. As mentioned above, this yarn is now selling for \$0.75 per pound. The 150 denier rayon yarn corresponds in size to about a 36 cotton yarn. Just as in the case of all other yarns, the finer the synthetic yarn, the more it costs to manufacture it, but in the case of the synthetic yarns this increase in the cost of manufacturing the fine yarns is not as great as in the case of fine cotton yarns. The selling price of 50 denier rayon yarn is now about \$2.15 a pound. This corresponds to about 100 singles in mercerized cotton, which are selling for about \$1.50 or \$1.60 per pound. It is possible that in some plants at present it is possible to manufacture the finer sizes of rayon yarns for less than the cost of high quality, bleached, and mercerized cotton yarns. This will undoubtedly eventually bring about a very considerable reduction in the amount of fine cotton yarns used, and a corresponding increase in the use of synthetic yarns. These yarns will also cut into the use of real silk very considerably.

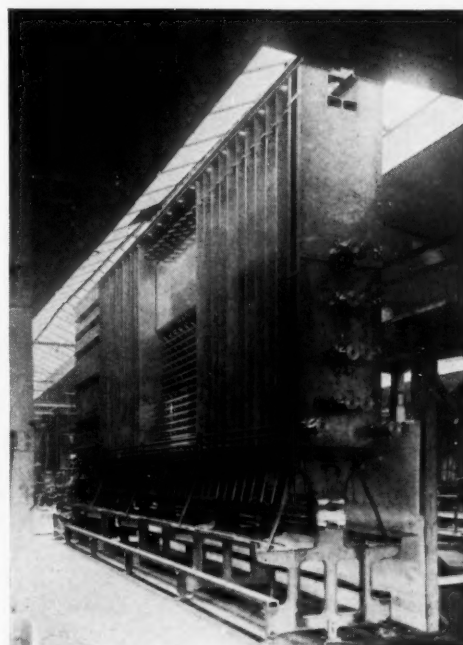
Immediate Changes

Undoubtedly one of the greatest changes in the immediate future will be in the position of acetate silk in the synthetic yarn field. This is entirely due to the superior quality of this product and to the rapidly decreasing manufacturing costs by this process.



Two Views of an Acetate Silk Dry-Spinning Unit in process of construction. The individual spinning pumps and filters are located on the top and the spinnerets extend through openings in the top into the tall, narrow, individual, spinning chambers, as shown. Each chamber is provided with a window at the top and bottom, and a perforated ring of pipe near the top to draw off the solvent-laden warm air. The filaments leave the spinning chamber at the bottom and are collected on bobbins, as shown. The bobbin driving mechanism is shown on one end, and the temperature control circulation pipes on the other end. Both sides of the spinning unit are the same.

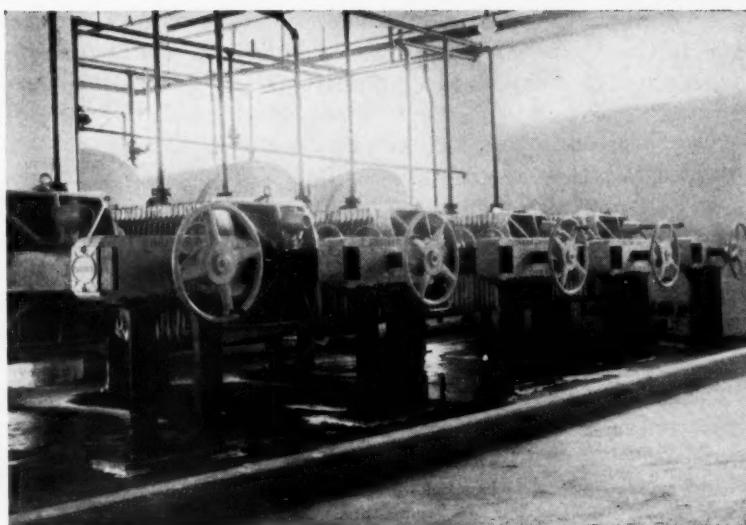
Courtesy of Oscar Kohorn & Company



Practically every large synthetic yarn manufacturing company is either directly or indirectly interested in the manufacture of yarn by the acetate process and the Celanese companies are practically the only independent group of synthetic yarn manufacturers in the world today. Another trend in the industry in the past has been the gradual elimination of the nitrate process in favor of cheaper methods of manufacture. Although the present nitro yarn is very satisfactory, the production cost is undoubtedly higher than that of the viscose type.

In spite of all the enormous increases in the production of the synthetic yarns within recent years, and all that we have heard regarding the "saturation point," the real and permanent saturation point is just as far off today as it was ten years ago, if the research and developments of the past are continued at the same rate. It is true that the sales competition will be more keen in the future and that certain unprogressive plants may pass into the discard, but this very competition will be the greatest stimulus to research and further advancements that the industry has ever experienced. The growth of this industry means more plants in the South, the most progressive and rapidly developing part of the United States.

Table I (page 366) gives the production of synthetic yarns by countries and types of yarn for 1929. Table



Filter presses for caustic soda solution clarification in the plant of the Industrial Rayon Corporation. Caustic soda is one of the most important raw commodities of artificial rayon productions

II (page 367) gives the percentages of the world's synthetic yarn production by types for 1928, 1929 and 1930. Table III (page 367) gives the production, importation, exportation, and consumption of synthetic yarns by countries for 1930. Table IV (page 367) gives the American production by companies for 1929, 1930 and 1931. As shown in Table III, the United States is also by far the largest synthetic yarn consumer, and uses more than the world's three largest producers (and consumers) combined. Undoubtedly the largest part of this yarn is used in textile plants located south of the Mason and Dixon line.

TABLE I
Estimated Production of Synthetic Fibers by Countries and Processes for 1929¹

Country	(Pounds)				
	Viscose	Acetate	Cupra	Nitro	Total
Austria.....	3,620,000	.....	.....	.....	3,620,000
Belgium.....	10,700,000	1,500,000	.....	2,800,000	15,000,000
Brazil.....	950,000	.....	.....	.....	950,000
England.....	40,920,000	11,360,000	820,000	.....	53,100,000
Canada.....	2,813,000	937,000	.....	.....	3,750,000
Czechoslovakia.....	4,250,000	.....	.....	.....	4,250,000
France.....	32,730,000	3,500,000	700,000	70,000	37,000,000
Germany.....	33,200,000	800,000	11,000,000	.....	45,000,000
Greece.....	580,000	.....	.....	.....	580,000
Holland.....	20,000,000	.....	.....	.....	20,000,000
Hungary.....	.....	.....	.....	670,000	670,000
Italy.....	56,900,000	1,000,000	1,100,000	.....	59,000,000
Japan.....	18,000,000	.....	.....	.....	18,000,000
Poland.....	3,635,000	.....	.....	1,800,000	5,435,000
Spain.....	2,000,000	.....	.....	.....	2,000,000
Sweden.....	420,000	.....	.....	.....	420,000
Switzerland.....	12,250,000	.....	.....	.....	12,250,000
United States.....	104,330,000	7,000,000	2,300,000	9,500,000	123,130,000
Totals.....	347,298,000	26,097,000	15,920,000	14,840,000	404,155,000

¹Textile World 78, 1489 (1930.)

TABLE II
World Production of Synthetic Yarns by Processes²
(In 100 pounds)

Process	1928		1929		1930	
Viscose.....	290,470	84.3%	347,298	86.0%	363,271	86.5%
Acetate.....	25,100	7.3%	26,097	6.5%	32,648	7.8%
Cuprammonium.....	13,950	4.0%	15,920	3.9%	14,396	3.4%
Nitro-cellulose.....	15,030	4.4%	14,840	3.6%	9,596	2.3%
Total.....	344,550		404,155		419,911	

²Douglas G. Woolf, *Textile World* 77, 647 (1930).

TABLE III
World Production and Consumption of Synthetic Yarn for 1930³
(In 1,000 Pounds)

	Production	Imports	Exports	Theoretical Consumption	Estimated Consumption
Austria.....	2,090	3,080	1,650	3,520	3,080
Belgium.....	12,320	1,650	6,160	7,810	7,040
Britain.....	50,600	550	6,600	44,550	40,700
Czechoslovakia.....	3,960	8,470	1,760	10,670	10,120
France.....	40,810	3,135	18,700	25,245	22,000
Germany.....	44,000	25,300	16,170	53,130	55,000
Greece.....	110	.....	.....	110	110
Holland.....	17,600	2,750	17,710	2,640	2,640
Hungary.....	550	3,080	396	3,234	3,740
Italy.....	66,000	2,420	36,300	32,120	29,920
Poland.....	5,500	660	1,870	4,290	4,070
Spain.....	2,860	6,600	.....	9,460	8,800
Sweden.....	462	2,200	22	2,640	2,860
Switzerland.....	11,220	3,960	8,250	6,930	6,380
Other European.....	.....	7,243	.....	7,243	5,830
Total.....	258,082	71,098	115,588	213,592	202,290
China.....	.....	18,700	.....	18,700	16,500
India.....	.....	6,490	.....	6,490	6,050
Japan.....	26,400	880	2,200	25,080	23,100
Other Asia.....	.....	2,200	.....	2,200	1,980
Total.....	26,400	28,270	2,200	52,470	47,630
Total Africa.....	.....	2,200	.....	2,200	1,980
Canada.....	5,060	1,870	.....	6,930	6,600
United States.....	130,369	6,617	308	136,678	120,000
Other N. A.....	.....	1,760	.....	1,760	1,650
Total.....	135,429	10,247	308	145,368	128,250
S. America.....	.....	2,200	.....	2,200	1,980
Australia.....	.....	4,081	.....	4,081	3,850
Grand Total.....	419,911	118,096	118,096	419,911	385,980

³*Textile World* 78, 1489 (1930).

TABLE IV
American Domestic Synthetic Yarn Production

	Total 1929	First 7 Months of 1930	Total 1930	Total 1931
Viscose Co.....	62,000,000	30,000,000	62,500,000	70,000,000
Du Pont Rayon Co.....	24,500,000	11,750,000	20,250,000	27,000,000
Tubize Chatillon Corp.....	10,250,000	6,000,000	11,000,000	15,000,000
Celanese Corp.....	7,000,000	5,750,000	10,000,000	15,000,000
Industrial Rayon Corp.....	5,375,000	5,800,000	10,550,000	12,000,000
American Glanzstoff.....	3,850,000	4,000,000	7,000,000	9,000,000
American Enka Corp.....	625,000	2,600,000	4,600,000	6,000,000
American Bemberg Corp.....	2,300,000	1,750,000	3,000,000	5,000,000
Skenandoa Rayon Corp.....	1,330,000	966,000	1,932,000	3,500,000
Delaware Rayon Co.....	2,000,000	875,000	1,500,000	2,000,000
Belamose Corp.....	1,500,000	885,000	1,585,000	1,800,000
Woonsocket Rayon Co.....	.....	594,000	1,184,000	1,560,000
New Bedford Rayon Co.....	500,000	820,000	1,420,000	1,500,000



Potash

Can the United States Free Itself of Foreign Dependence?

(Part II.)

By George Ward Stocking*

SCIENTIFIC interest in the Permian Salt Basin of Western Texas and eastern New Mexico as a potential source of commercial potash dates back to 1911. In December of that year Dr. J. A. Udden, then geologist, later Director of the Bureau of Economic Geology, of the University of Texas, while on a visit to a well being drilled in Dickens County, Texas, was led by the presence of much anhydrite and salt in the boring to suggest that the water of the well be analysed for potash. Subsequent analysis of a sample of water taken from a depth of 2,200 feet revealed the existence of a potassium chloride content of 5.4 per cent of all solids present. The shortage of potash engendered by the War gave added incentive to carry forward the search thus begun for commercial sources of potash in the Southwest. After the Texas Bureau of Economic Geology had reported potash mineral present in three additional wells in 1915, the United States Geological Survey in the winter of 1915-16 began a test boring for potash in Potter County which, completed in 1917, proved unsuccessful. Thereafter during the period 1918 to 1921, under a co-operative arrangement between the Bureau of Economic Geology and the United States Geological Survey, the work of collecting and analyzing rock samples taken from wells

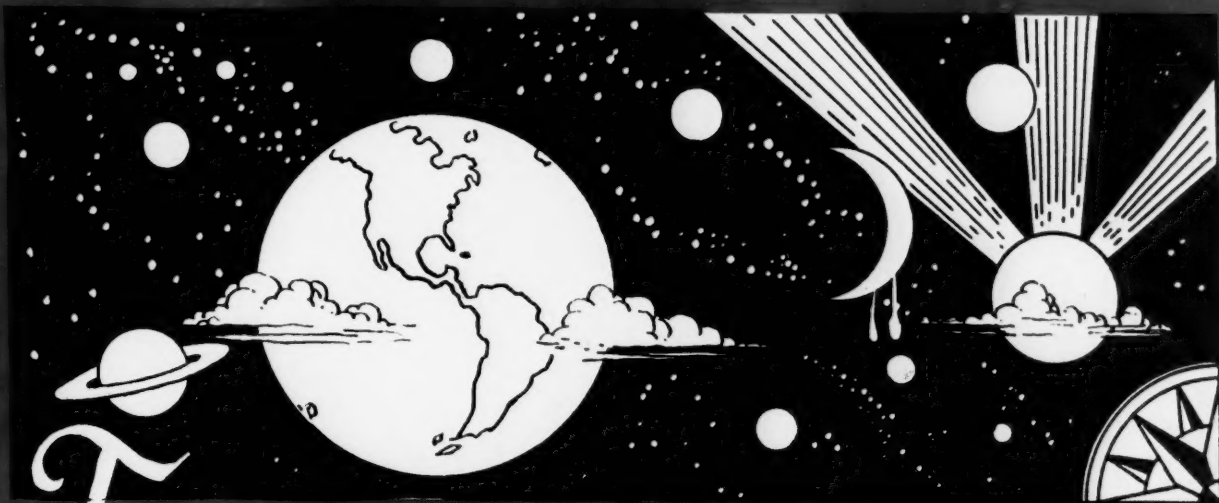
In the second of Professor Stocking's articles on the international potash situation he describes the prospects of potash in the Permian Salt Basin in the Southwest.

being drilled in the salt basin of West Texas was continued. The encouraging results obtained from this work, together with that independently done by the Geological Survey subsequent to 1921, accompanied as it was by the almost complete demor-

alization of the war-born American by-products potash industry under the severe post-war competition of the foreign industry, led to the passage by Congress in 1926 of an act providing for the appropriation of \$100,000 annually for a period of five years to be spent in a search for potash in the Permian Salt Basin.

Under this act a total of sixteen core-drilled wells have been completed under the supervision of the Bureau of Mines and their cores analysed by the United States Geological Survey. The findings have since been made public. Analysis of the cores has revealed the presence of potash in the form of polyhalite (K_2SO_4 , $MgSO_4$, $2 CaSO_4$, $2H_2O$) in each of the wells. In the words of the spokesman of the Bureau: "Not all of these occurrences have possible economic importance, but unquestionably some of the deposits revealed by this drilling are of considerable importance in an economic sense." The richest of the deposits were found at a depth of 1405 feet in the "unlucky" thirteenth hole. Here was revealed an eight foot bed of polyhalite, three feet, three inches of which is practically pure, with an average potash content for the entire thickness of 12.21 per cent.

*Professor of Economics, University of Texas



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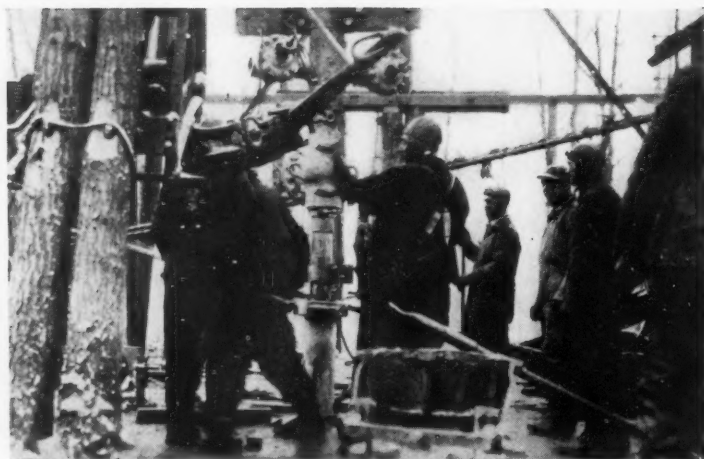


Keystone

CHEMICAL

Photographic Record

Dr. John A. Wilson (John A. Wilson, Inc.), is the man who placed Milwaukee in the fertilizer business. In recognition of his achievements in the field of sewage disposal he is awarded the Nichols Medal, March 13



Wide World

Capping a huge gas well in Tioga, Pennsylvania, one of the largest ever found in the East. Natural gas is knocking at the gates of New York City. Reported plans call for supply ducts early this year



Andrew W. Mellon is honored on his 76th birthday by the American Institute of Chemists. Both he and his brother, Richard B. Mellon, receive the Institute's medal award for their noteworthy contributions to American chemistry. Below, architect's drawing of the new Mellon Institute Building at Pittsburgh, Pa.



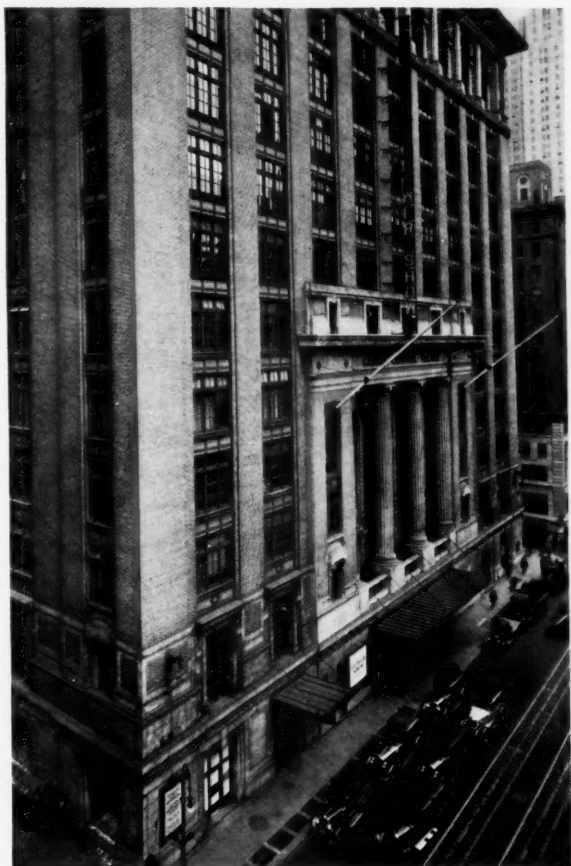
Aeme

Chemistry's contribution to the building industry. Airplane view of the Empire State Building's mooring mast in New York City. Aluminum and chromium metals are employed for decorative effect. Empire State may become the chemical center in New York. DuPont Companies and Columbia Chemical are already announced as tenants



NEWS REEL

of Chemical Activities

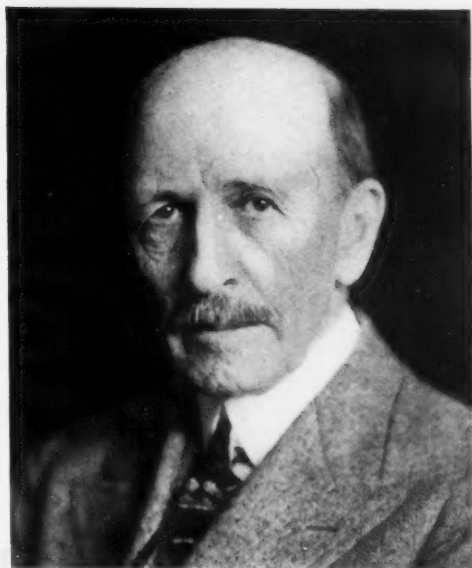


Herbert

Grand Central Palace, New York City, will again play the host to the chemical industry during the week of May 4-10. Chemical Markets suggests that you use its booth (Number 28) as your headquarters

Prof. William McPherson, Ohio State, and President of the A.C.S. leads the Society at its 81st meeting (March 30-April 2). Below, the Soldiers' and Sailors' Monument, Indianapolis, Ind., located at very center of Hoosier activity

Moses Gomberg, the new President, assumes his new responsibilities

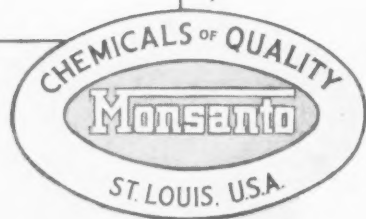


Keystone

Below, the Drug and Chemical Section, N. Y. Board of Trade dinner is held at the Hotel Commodore, March 12, with Senator Royal S. Copeland as the principal speaker and heard by a record attendance



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A BACKGROUND OF 30 YEARS
OF MANUFACTURING

Meanwhile, before the funds for exploration for potash had been made available by federal appropriation, private capital had independently made significant discoveries of potash deposits. In April, 1926, the Standard Potash Company, controlled by local Texas capital, completed a core-drilled well in Midland County, Texas, which had been begun in July, 1925. Analysis of the cores of this well, made by Professors E. P. Schoch and E. H. Sellards of the University of Texas, revealed the existence of a five-foot bed of practically pure polyhalite at a depth of 2075-2080 feet. This is said to have been the first mineable layer of potash salts found in the West Texas-New Mexico area. Subsequently the same company drilled a second well at a distance of approximately three and one-half miles from the first which revealed an eleven-foot deposit containing 60 per cent of soluble salts with 10 per cent potassium oxide at a depth of 1980-91 feet, and a three-foot layer of pure polyhalite at a depth of 2172-75 feet.

Oil Interests Enter

Meanwhile, in 1925, Mr. V. H. McNutt, consulting oil geologist, had recognized traces of potassium chloride in a well drilled for oil in Eddy County, New Mexico, by the Snowden-McSweeney oil interests. Encouraged by these findings, Mr. McNutt interested his associates and began a search for potash on its own account. A core-drilled well sunk on the same property with the discovery well, the cores of which were analysed first by Company chemists and later by the United States Geological Survey, disclosed the existence of ten potentially commercial groups of potash beds, consisting for the most part of polyhalite, but containing three strata of the more valuable sylvite. To carry forward the work thus begun under such promising circumstances, the American Potash Company (now the United States Potash Company) was organized. Up to January, 1929, the United States Potash Company under the immediate supervision of Mr. McNutt who had made twelve core tests on Federal land and two on State land within a radius of a few miles of the first test, all in Eddy County, New Mexico. These cores have been analysed both by Company chemists and by representatives of the United States Geological Survey. In addition to these cores, the Survey has analysed those recovered by the Gypsy Oil Company from four test wells sunk in the same general area. Detailed results of the Survey's findings in these privately drilled wells have not yet been made public. Nevertheless it has been authoritatively stated that at depths as shallow as 750 to 1,000 feet "excellent cores have shown beds of sylvite

and polyhalite, ranging in thickness from two feet to seven feet and carrying from 10 to 20 per cent of K_2O in the samples as received." (See Mansfield, G. R., and Lang, W. B., *Government Potash Exploration in Texas and New Mexico*, Technical Publication No. 212, 1929, American Institute of Mining and Metallurgical Engineers.) When account is taken of the fact that the average potash content of the total of German potash salts mined in 1928 was only 13.6 per cent, the promising character of these findings is evident.

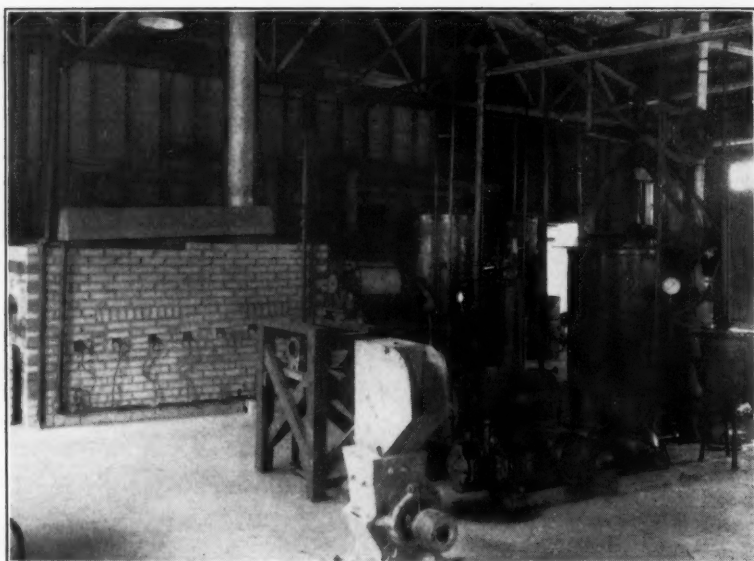
Operators are Capable

That private American capital, ever eager for new fields of conquest, will be attracted into the actual business of potash production as a result of the findings of explorations already carried out in the Southwest, seems more than probable. In truth, the Texas Potash Corporation, incorporated for the "purpose of mining, refining and marketing potash and its products" has taken over the properties of the Standard Potash Corporation and is now carrying on a campaign to secure additional capital for the construction of a shaft and a refining unit on its properties in Midland County, Texas. Already practical men of the business world have put enough of their cash into the enterprise to indicate their confidence in it. More important, the objective findings of scientists of note have furnished a substantial basis for their procedure. Whatever may be the outcome of the venture, the Texas Potash Corporation seems to have been organized for the business of potash production. Their plans envisage the actual production and marketing of potash within the calculable future.

The venture of the United States Potash Company seems even more significant. It is backed by the



The United States Bureau of Mines is lending its full cooperation to the question of American potash. On page 368, the exterior of the Department's special laboratory at New Brunswick, N. J., and above, a view of the control laboratory. Photos, U. S. Bureau of Mines



View showing on the left the experimental rotary kiln, 6' x 11', 1 x 1 Oliver filter, Dorr agitator, steam jacketed kettle, and in the immediate foreground the Williams patent crusher

Snowden-McSweeney-McNutt oil interests with ample capital at their command. Of more importance, it has definitely shown its faith in American potash by the expenditure of not less than half a million dollars in exploration work. With an area tested in which potash has been proven to exist, in amount and character believed comparable to the best French and German deposits, this company is, likewise, proceeding with its plans for the producing of potash. With a shaft for the mining of potash salts already under construction, it bids fair to be the pioneer producer in the field.

American Possibilities

When account is taken of the tremendous area over which the Permian Salt Basin of West Texas and New Mexico extends—covering as it does an area approximately 70,000 square miles in extent—and of the relatively small amount of exploration work which has thus far been carried on, these promising beginnings would seem to augur the ultimate freeing of America from its dependence on foreign potash. That possibility makes appropriate a more careful consideration of the prospects of the industry and of the types of problems which an infant industry may encounter. As mining ventures, the Texas and New Mexico deposits compare very favorably with the foreign deposits. The deposits thus far revealed vary in depth from about 500 feet to 2,700 feet. The sylvinite deposits discovered in Eddy County, New Mexico, lie at depths of from 750 to 1,000 feet. The polyhalite deposits of Midland County, Texas, lie at a depth of about 2,000 feet. The bulk of the German output comes from approximately this latter depth, although there are extreme variations from this figure. Most of the French production comes from

depths of 1,700 to 2,100 feet, although in some cases production is carried on at depths as great as 3,500 feet. The German deposits are found under highly varied conditions. The carnallite deposits of the Magdeburg-Stassfurt area are found with a thickness of as much as 150 feet, the deposits are steeply pitched, and backfilling is necessary in mining. In the Werra-Fulda district to the southwest of the Harz mountains, deposits of hartsalz of striking regularity are found with a thickness of from 6 to 25 feet. Mining here is carried on under nearly ideal conditions, backfilling being unnecessary. The rich sylvinite deposits of the Hannover district, presumed to be secondary in their origin, are generally meager in their thickness and slight in extent. The deposits are highly folded, often mere horsts or steeply pitched pockets. These shortcomings are more than compensated for by the strikingly

rich quality of the salts. In contrast with these highly varied conditions under which foreign potash is found, the deposits of the Permian salt basin seem to be more regular in character. On the whole, they apparently promise greater uniformity of mining conditions. It would seem a safe generalization that in so far as natural geological conditions are concerned they offer no serious obstacles, on the whole affording a more attractive mining venture than do the deposits of Germany.

American Advantages

Moreover, an American industry would seem to have an advantage in that the mines may be equipped at the outset with the most improved and efficient type of mining machinery. The foreign industry, despite the far reaching rationalization program which has been carried on since the War, still finds itself handicapped somewhat by equipment of an inefficient and obsolescent type. With adequate capital, skilled technical advisors and competent managerial ability, the American industry should find itself perhaps in a position of competitive advantage in so far as mining costs alone are concerned. High wage costs may be overcome by more efficient organization and more complete mechanization. A cheap fuel supply may be found in the oil and gas convenient to the discovered deposits.

For the most part, German potash fertilizer salts are secured from hartsalz (a mixture of sodium chloride, potassium chloride and potassium sulphate) sylvinite (a mixture of sodium chloride and potassium chloride) and carnallite (a mixture of potassium chloride and magnesium chloride). The most readily refinable of these salts is sylvinite. Sylvinite salts are first crushed and then poured into a solution of potassium chloride

and sodium chloride which has been raised to the boiling point after having been saturated at normal temperature. At the higher temperature the potassium chloride of the original salt goes into solution, the sodium chloride remains undissolved and is separated off, and the residual liquor upon cooling yields through crystallization commercial potassium chloride. The presence of potassium sulfate (to form the so-called hartsalz) or magnesium chloride (to form carnallite) complicates the refining process somewhat, particularly in the case of carnallite, but additional costs are in part compensated for by the by-products which are secured.

The Question of Freight Rates

Nevertheless, there seems to be little opportunity for profitable refining of carnallite in competition with the more readily refined sylvinite and hartsalz, and a great many of the carnallite mines in the German industry have been closed and abandoned in the rationalization program which has been carried through in Germany since the War.

It will be recalled that in New Mexico deposits of the easily refinable sylvinite have been discovered by the United States Potash Company, which is now proceeding with the work of development through the sinking of a mining shaft. These deposits occur at depths as slight as 750 to 1,000 feet, and if they are as high in potash content as reported, they average well above those of the German industry as a whole. The United States Potash Company, possesses adequate capital to develop the deposits which it has discovered in the most approved manner which modern science affords.

Nor are marketing difficulties of a prohibitive character likely to be encountered by an industry operating in the Southwest Permian Basin. Potash consumed in the United States finds its major use as a fertilizer primarily in the cultivation of cotton and tobacco. The present major consumption area lies along the Gulf Coast region, east of the Mississippi River and along the Atlantic Coast. Trans-Atlantic freight rates on German potash salts are given by the Bureau of Mines at \$4.73 per short ton. At present as there is no traffic in potash salts between the Permian Salt Basin area and the consuming regions, no freight rates are quoted, but it may be stated on reliable authority that railways serving this area have expressed a willingness to deliver potash from this general region to New Orleans at \$5.25 per ton, and it is believed that subject to the approval of the Interstate Commerce Commission a rate of \$4.75 per ton may be secured. This would seem to place Texas-New Mexico potash on a competitive basis with foreign

potash in so far as freight rates are concerned for much of the consuming area. With cheap fuel, competitive freight rates, adequate capital, competent managerial ability and skilled technical advisors, and abundant deposits of the easily refinable sylvinite salts, the United States Potash Company should be a going concern within the near future.*

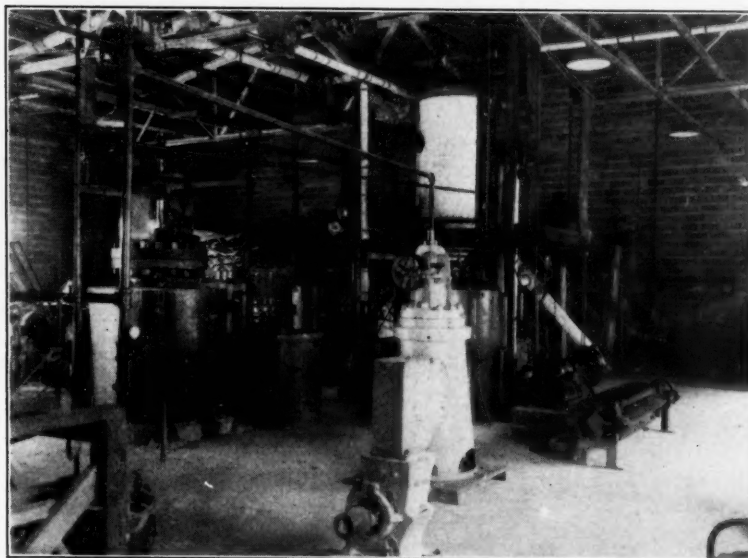
It should also be noted that in each of the wells drilled by the Standard Potash Company in Midland County, Texas, portions of the cores were lost by the dissolving action of the "drill water." Undissolved pieces of these cores about the size of an egg are said to have averaged 17.03 per cent of K_2O . This would indicate that the dissolved portions of the cores may have consisted of soluble salts (perhaps carnallite or sylvinite) with as high or higher potash content.

Bureau of Mines Findings

Aside from the findings discussed above, no deposits of sylvinite of possible commercial importance have as yet been discovered. More abundant are the polyhalite deposits. These, it will be recalled, have been encountered in each of the sixteen exploratory wells drilled by the United States Bureau of Mines and in wells drilled by private capital. Indeed, private capital, as previously stated, has located what appear to be excellent deposits in Midland County before the government launched upon its program of exploratory drilling, and private capital is now preparing to exploit these deposits. The Bureau of Mines this year released the results of an intensive laboratory and economic research project regarding the commercial possibilities of polyhalite from the Texas-New Mexico area (See Wroth, James S. *Commercial Possibilities of the Texas-New Mexico Potash Deposits*, Bulletin 316,

*The U. S. Potash Co. shaft is now completed and actual shipments are being made.

View showing forced circulation vacuum evaporator in background, high pressure filter press, 15-gallon high pressure autoclave, 100-gallon high pressure autoclave and Williams Patent Crusher in immediate foreground



Bureau of Mines, 1930.) According to the Bureau's findings, a potash industry based on polyhalite may deliver commercial potash fertilizers to the major consuming areas at a cost which will enable them to compete with the foreign salts at current prices.

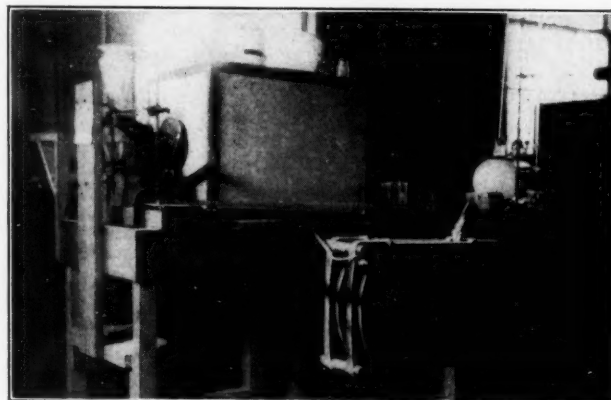


Photograph showing the staff at the side entrance to the laboratory

Without endeavoring to pass judgment at this point upon the conclusion reached by the Bureau of Mines (a more detailed consideration of this question is given in the author's forthcoming book, *The Potash Industry: A Study in State Control*, to be published soon.) I should like to call attention to certain obstacles to be encountered in the refining of polyhalite. In contrast with sylvinite salts, which represent a mechanical mixture of the constituents, the sulphates of potassium, magnesium and calcium, which form the basis of polyhalite, have lost their identity, polyhalite being a homogenous substance of different chemical energy from that of the constituents which compose it. The first task of refining is to break the compound down into its sulphate constituents. This involves first crushing and fine grinding after which prolonged heating is required (from 45 to 50 minutes according to the process worked out by the Bureau of Mines) at high temperature (from 440 to 450 degrees Fahrenheit). Thereafter, upon quenching with a volume of water two and one-half times that of the original salt, pre-heated to a temperature of 163 degrees Fahrenheit, the potassium and magnesium sulphates go into solution, the calcium sulphate remaining undissolved. After separation of the calcium sulphate by filtration, it is necessary to put the remaining liquor through an evaporation process to concentrate it with respect to potassium sulphate. The refining of polyhalite would seem to be at a disadvantage in two respects in comparison with the refining of sylvinite. In the first place, it is necessary to crush and grind the original salt to a 65 mesh prior to calcination. With the more soluble salts mere crushing without fine-grinding will suffice before refining—one entire process is thereby eliminated. In the second place, the evaporation process in the refining of polyhalite will involve a heavy fuel expense, the largest single item of expense according to calculations based on the cost estimates of the Bureau of Mines. Calculations based on data secured from German sources indicate an average cost

of \$2.97 per ton of K_2O for fuel and power in 1928. Calculations based on the Bureau of Mines' estimate of fuel and power cost per ton of K_2O produced from polyhalite in West Texas give a cost of \$11.55 per ton of K_2O . Despite these handicaps, however, it is possible that the polyhalite deposits may permit of profitable operation for a limited market for potassium sulphate (the bulk of the foreign output is marketed as chlorides) which for certain crops, such as tobacco and citrus fruits, seems to be a preferable fertilizer. Moreover, it is alleged that potassium sulphate has in some respects an advantage over chlorides in the general market. For example, in fertilizer mixtures potassium sulphate is said to develop no tendency to cake. The opinion is held by some that this fact may make possible a wider market for the product. Also in the chemical field in the preparation of caustic potash from potassium sulphate a direct metathetical reaction with lime gives the result direct because calcium sulphate is relatively insoluble. The preparation of caustic potash from potassium chloride is said to be more expensive. Similarly in the preparation of certain other potassium salts, the sulphates have the same advantage. Finally, it is possible that the disadvantages under which polyhalite suffers may be in part compensated for by the utilization of its other constituents as by-products. A process of refining worked out independently by Dr. E. P. Schoch of the University of Texas is said to possess a marked advantage in this respect over that developed by the Bureau of Mines.

In any event, the developments as herein discussed indicate that the commercial possibilities of both sylvinite and polyhalite may soon be tested. Should these pioneer enterprises in the utilization of the potash deposits of the Permian salt basin prove to be commercially successful, additional capital may be expected to flow into the industry—perhaps with reckless abandon. Scattered as the deposits are over a wide area, they offer an inviting field for the wild-catter and the speculator. Should these early ventures prove



View of the laboratory-sized kiln

successful, it would seem likely that in time capital is destined not only to develop but to grossly over-develop these areas.

Patents and Research



By Joseph Rossman, Ph. D.*

INDUSTRIAL research may be defined as a systematic study of the facts and principles of science and technology with a view to their practical application for industrial purposes. Industrial research has also been defined as "the application of engineering and its basic sciences to the utilization of nature's forces, physical, and spiritual, and nature's materials to the betterment of man's position in this world in which we live."¹

Two Kinds of Research

It is obvious that industrial research and invention are very intimately related to each other for the practical application of knowledge usually leads to physical devices, particularly in the industries. Knowledge of forces and facts of nature is obtained by discovery, which may be found sometimes accidentally, or, as in the case of research, deliberately. Pure research is a term which is often used to designate the search for and discovery of new knowledge as contrasted with the term industrial research which is used for the practical aspect of discovery.

The methods used in pure and industrial research are identical. The two kinds of research only differ in their motives or objectives. Some of the distinctions between discovery, research and invention can be briefly given as follows:

Research is a systematic investigation for the purpose of discovery, and discovery is the finding of new facts. Discoveries may obviously also be accidental findings of new facts. We find by research or discovery what has existed before and what has been inherent in the nature of things but which has been unknown. Discoveries thus increase our fund of knowledge. They do not necessarily have a practical utility in themselves. Thus many of the achievements in pure

science are discoveries. The objects of research and invention are quite different. Research is seeking new knowledge, while invention is the application of existing knowledge to practical ends. When important new knowledge is discovered through research, invention will very often follow.

Practically all research organizations today obtain patents whenever the results of the research produces patentable inventions. Inasmuch as vast sums, which have been estimated to be around \$200,000,000, are spent each year on research, it would be interesting to know whether this research work would be carried on if legal protection for the resulting inventions was not available.

The views of nearly a hundred research directors of great American laboratories were obtained in regard to this question. It was found that the majority of the directors were heartily in favor of a patent system. Even those directors who stated that their research would go on whether patent protection was available or not believed that the absence of a patent system would be a great hindrance because research would probably be curtailed and the publication and discussion of results would be greatly hindered. Many important findings would be kept secret so that other workers would not be stimulated to further research. Ultimately this state of affairs would become a detriment to industrial progress. As one research director said:

"Patent protection is vital to the proper development and continuance of industrial research. Without patent protection it would be impossible to obtain large appropriations for conducting the more expensive and long-continued types of industrial research. We conduct much research without thought of patent protection, and by publishing the results, contribute to the general advancement of industry. However, the cost of

*Member U. S. Supreme Court Bar

¹Craft, E. B., Industrial research, Journal of the Worcester Polytechnic Institute, 1928, 31, 137-142.



Patent examiners at work protecting the research activities of this country and also many foreign countries

such research is often borne (or the expenditure made possible) by the financial returns from patented inventions."

It was gratifying to find that nearly all research directors were imbued with the spirit of the Constitutional provision which gave Congress the power to grant patents "to promote the progress of science and useful arts." Our patent system has functioned remarkably well from this standpoint, but unfortunately our individual inventors have not profited greatly from their patents. In a recent article Edison has stated, "I have made very little profit from my inventions. In my lifetime I have taken 1,180 patents, up to date. Counting the expense of experimenting and fighting for my claims in court, these patents have cost me more than they have returned me in royalties. I have made money through the introduction and sale of my products as a manufacturer, not as an inventor."

Financial Return Through Patents

Research is, of course, necessary for progress whether patent protection can be secured or not. A great deal of research is carried on each year for which no patent protection can be secured but which never-

theless yields economic improvements. Research, however, would be too expensive for most companies were it not for patent protection of some of their developments which ultimately brings in financial returns for research expenditures.

One research director believed that competition is the cause of a great deal of industrial progress. He said:

"While patent protection may to some extent encourage research work, competition appears to be a much greater incentive. It is, therefore, probable that research would still be pursued in the absence of the Patent Office. The feeling of protection, however, makes research easier as it promotes the publication of new material which otherwise might not come to the notice of workers in related and distant fields of endeavor. As most worth while developments are the result of numerous but relatively small contributions, any agency which tends to promote the publication of ideas is a big asset to research.

Several directors went so far as to state that they would carry on research if patent protection were not available. The following are typical remarks:

"Research conducted without patent protection is most practical. This procedure eliminates a great many details with which the ordinary research worker is uninterested in. Furthermore investigators do not have the idea that they are working to make millions, but rather to give humanity the benefit of their special ability."

* * *

"Research has become such an important factor in modern business, as insurance against adversity resulting from advances from scientific knowledge which may render product or process obsolete, that even if the patent system were abolished, some research would undoubtedly be continued. On the other hand, industrial research laboratories of the present size would probably not be justified were it not for patent protection."

* * *

"If there were no such thing as patent protection, we would probably continue to do development work, but we would probably have to carry it much more secretly than we do now, as we now depend upon dated sketches and drawings for protection during the development period."

* * *

"If patent protection were not available we would continue to do research work but we would probably have to curtail our publication and discussion of results as far as field and applied research is concerned. Fundamental research, of course, is not primarily directed toward patentable results."

* * *

It can be seen from these remarks that although these men would carry on research, yet they feel that

they would be handicapped without patent protection. The development of a process or discovery of new methods especially in the chemical industry often gives the company at least a two-year advance over any competitor. In these days of scientific technique, however, it is difficult to keep technical developments secret for very long, and in the long run patent protection is probably the safest thing against competitors.

Disadvantages of Patents

There are some companies, however, which find it best not to patent the results of their research for as one chemical director has said:

"Our research work and inventing are intended for improvement of our own products. Most of our inventions pertain to formulas or manufacturing procedures. To patent them would be to disclose them and enforcement of patents is too difficult to be worth the effort. We simply protect ourselves against others through our research records and sales records."

Another director has said:

"In our work a patent is sometimes a distinct disadvantage as it reveals too much and may give an unfriendly competitor a valuable suggestion. Unless a client has sufficient funds for purposes of litigation he would better protect his chemical patents in other ways. In other cases, where special machinery or apparatus is necessary, a patent is of great value."

Fortunately secret processes and methods are the exception in the industries. Most companies find patent protection essential in their business. An extremely important reason for this is expressed in the following remark of a director:

"I have found in my experience of nearly 45 years that patent protection is absolutely essential to cover the products of a commercial laboratory; not so much for the return which comes from a patented article as from the fact that

others may patent work which has already been done and thus involve expensive litigation."

Another director has said:

"We would not favor conducting research without patent protection. The principal reason for this is to prevent other persons from preventing you from developing your own inventions by patenting them themselves."

It thus seems that many companies obtain patents not because they wish to further "the progress of science and useful arts" but to protect themselves from possible developments by competitors or others. This is particularly evident in the industries which operate under elaborate patent pools and a maze of license agreements. This situation may lead to the grant of "paper" patents or so-called "insurance" patents but aside from the question of illegal monopolies built up through patents, there is no doubt that even such patents have a distinct educational and stimulative value as cheaply available publications.

Protection Encourages Research

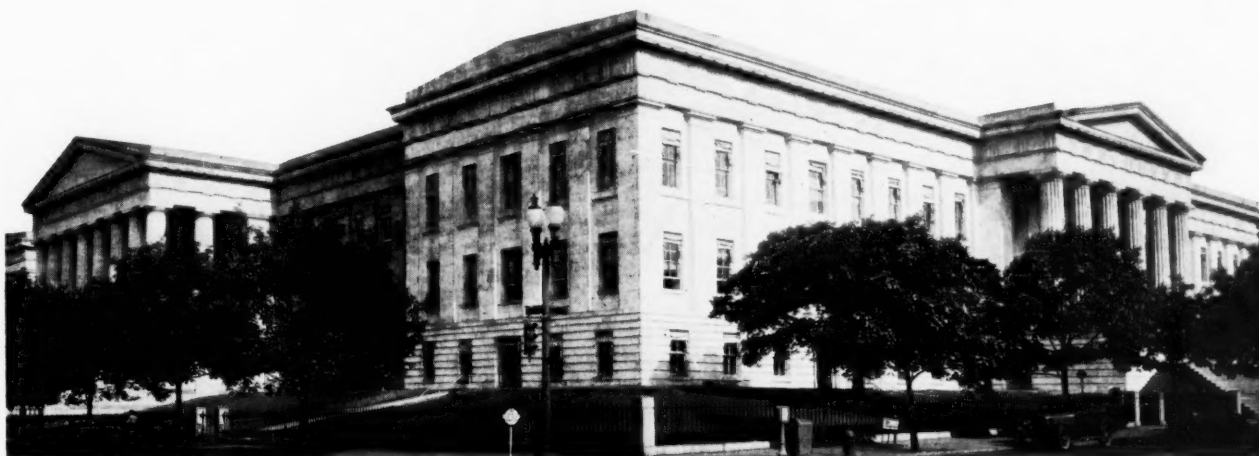
Patent protection is without doubt one of the greatest incentives in the development of an art. Many companies would not be justified in spending as much as they do at present on their engineering departments in the absence of patents. As Dr. William M. Grosvenor³ has said:

"Unless there is security in intellectual property no group of business men and investors is warranted in building an industrial and business structure thereon. They would be foolish to undertake the effort and expense of introducing the invention and educating the users. Why? Because any fly-by-night imitator, without the handicap of interest and amortization charges on the initial and development expenses, can make a profit at the actual cost of the pioneer and can drive him out of the business he has risked the time and money to build up."

The statement has often been made that our entire industrial progress is due to our patent system. There

³W. M. Grosvenor, *The Seeds of Progress*, Chemical Markets, 1929, 24, 23-26.

Exterior of the United States Patent Office, Washington, D. C.



is no direct evidence to support this. Mr. W. I. Wyman⁴ in a very interesting article has compiled the best available indirect evidence which tends to show that patent protection has stimulated inventive ingenuity. He believes that "every great invention since the mechanical revolution was inaugurated that had an industrial significance has been subject-matter of a patent grant." The writer has compiled a list of important inventions which appears to corroborate this statement. However, as Mr. Wyman states:

"That fact alone would appear to affirmatively establish the close association between patent protection and inventive stimulation, even if that association may not be so intimately related as cause and effect. Unquestionably, the patent system as administered by the advanced nations inevitably stimulates inventive productivity just as all open competitions stimulate endeavor in all fields whenever instituted. Not that other causes may not be present—such as abundance of raw materials, a high average of education, or a progressively-minded population. Nevertheless, if a basis for stimulation is present, if the elements that can possibly make for an industrial society be existent, then it appears certain as day follows night that the establishment of a patent system, properly administered, inevitably promotes inventive activity, lets loose the spirit of enterprise, and creates industry and wealth."

Holland As An Example

The abolition of patents in Holland in 1869 until 1912 has given economists an excellent opportunity to study the effect of patents on industry. Ravenshear⁵ has made a comparative study of the export trade of several countries including Holland during this period. He writes:

"It would no doubt, be more satisfactory, if the information could be obtained, to compare the investment of capital in manufactures in Holland before and after the cessation of the grant of patent. This information, is however, unobtainable, so far as the writer is aware. While the proportion of manufactures to total exports has increased in the case of Germany from 62.8 to 65.9 per cent, of France from 52.3 to 57.0 per cent, of Switzerland from 71.2 to 75.5 per cent, of Italy from 43.3 to 60.1 per cent, and of the United States 18.6 to 36.4 per cent, the proportion in the case of Holland has fallen from 27.2 to 17.6 per cent. The conclusion seems unavoidable that the change which has been taking place over a long period in Holland is due to the absence of a patent system."

If this is true for Holland at a time when the industries were not developed to the extraordinary degree which we find to-day, we might reasonably infer that

the absence of a patent system in our country would likewise be detrimental to its economic development. The replies from the outstanding research directors also indicate that patents are a great incentive to industrial research and progress. All available evidence seems to point in favor of a patent system.

Association News

The outstanding event in association news of the month was the sixth annual dinner of the Drug and Chemical Section of the N. Y. Board of Trade held on the evening of March 12, at the Hotel Commodore, New York City. The attendance was decidedly representative of the entire industry, and prominent members of the industry from Chicago and Philadelphia were present. On the same evening the Paint, Oil and Varnish Club held its annual dinner at the Hotel Biltmore.

Increased interest was being shown in preparations for the Chemical Exposition. Fred A. Koch, Dow Chemical Co., President of the Salesmen's Association of the American Chemical Industry, has announced the appointment of the special committee to have charge of the Chemical Show Week Dinner, sponsored by the organization during the week of each Chemical Exposition. Ira Vandewater, R. W. Greef & Co., will be chairman, Williams Haynes, Chemical Markets, is in charge of securing speakers, B. J. Gogarty, American Solvents & Chemicals Corp., invitations, Grant A. Dorland, MacNair-Dorland Co., publicity, Victor E. Williams, Monsanto Chemical Works, hotel and menu, Robert L. Wilson, Dow Chemical Co., tickets and seating list, and Charles F. Roth, representing the management of the Chemical Show.

The dinner has been scheduled for May 7. It will probably be held at the Roosevelt Hotel. As usual, the principal speaker will be a prominent individual whom it will be very worth while to hear. This dinner attracts a larger gathering than any other in the chemical field. Around twenty of the industry's most active associations, including most of the technical organizations, will co-operate with the Salesmen's Association in urging all of their members and friends to attend this regular feature of Chemical Show Week.

A note of friendly discord featured the addresses of the speakers, and the toastmaster of the recent dinner of the Drug and Chemical Section of the N. Y. Board of Trade. Mr. Kaltenborn, the well-known radio broadcaster and former editor of the "Brooklyn Daily Eagle," discussed outstanding events, stressing particularly



Dr. Wm. J. Schieffelin

the Soviet situation and possible recognition. Both the toastmaster, Dr. William J. Schieffelin and the second speaker of the evening, Senator Copeland were in sharp disagreement as to the correct procedure to be followed by this country. The subject of "investigations" entered rather prominently into the repartee between Dr. Schieffelin and the Senator from New York. The latter in mentioning Mayor "Jimmy Walker," "As one whom our toastmaster would investigate," was answered by Dr. Schieffelin to the effect that, "He hoped that we would have a mayor at some future date who did not require investigating." The reception before the dinner was well attended and afforded the members and their guests ample opportunity to gather together informally.

The meeting opened with a speech of welcome by Mr. Percy C. Magnus, Chairman of the Section.

⁴Wyman, W. I., The relation of the patent system to industrial progress, Journal of the Patent Office Society, 1926, 8, 261-270.

⁵Ravenshear, A. F., The industrial and commercial influence of the English patent system, London, 1908, 41-49.

Our South American Export Business Is Challenged*

QUIETLY and unostentatiously we have been building up our chemical export business. By many chemical companies this business has been looked upon with disdain, but others have cultivated it to their advantage. The present situation, with curtailed domestic sales for almost every producer of industrial chemicals, has shown the wisdom of a back-log of export sales. In 1930, for the first time in a peace year, our exports of chemicals and allied products have balanced imports. Although both figures are

below normal the favorable aspects of this statement are enhanced, by the fact that manufactured, or more appropriately finished chemical products, such as lacquers, for example, make up a very large part of these exports. There is considerable room for improvement in the foreign sale of the heavy or industrial chemicals. With production capacities now in excess of home consumption we will be forced to

look more earnestly into export markets. From a geographical viewpoint the South American markets naturally offer the best possibilities. The opening of the British Industries Fair in the Argentine



Avenida de Mayo, Buenos Aires, S. A.

The opening on March 18, of the British Exposition in the Argentine has focused direct attention on our chemical trade relationship with South America. As our production capacities increase, the foreign markets to the south of us will appear even more attractive than they are at the present time.

of muriatic acid, nitric acid, carbon bisulfide, sodium sulfate, borax, Paris green, acetylene, carbon dioxide, and oxygen.

Although Argentina has a variety of minerals, deposits of most of them are either poor or inaccessible,

attended by the future King of England and his brother serve to stress the importance Britain places upon export business. It should be thoroughly understood that the chemical industry in England is actively supporting the Fair. A few issues back of the "CHEMICAL AGE" carried the information that one of the Benn family (publishers of that paper) was on his way to Argentina to help "put over" British chemicals in that country. Accordingly a survey of the Argentine chemical industry and the present extent of

chemical business is very pertinent at the minute and will serve as a guide to possible sales outlets.

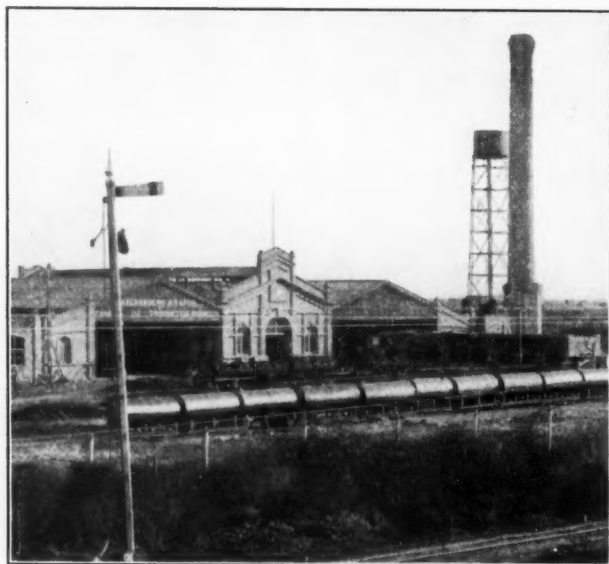
Production of industrial chemicals in Argentina is comparatively small and the bulk consumed is imported largely from the United States, Great Britain, and Germany. Sulfuric acid and aluminum sulfate are produced by the Government. The only other industrial chemicals made are relatively small amounts

*Incorporated in this review is the report "Argentine Chemical Industry and Trade," Commerce Reports, March 9.

and, with the exception of petroleum, salt, bismuth ores, and lime, are not exploited to any extent. Even the output of the oil fields, although increasing, is also relatively small, amounting to only 9,100,000 barrels in 1928. Argentine production of the principal mineral raw materials in 1929 was as follows: Limestone, 193,993 metric tons; lime, 397,839; gypsum, 36,629; sodium sulfate, 993; boronatreacleite, 935; salt, 197,799; lead ores, 4,512; and lead (pig lead), 1,696. The present annual output of salt cake amounts to approximately 1,000 tons.

The annual production of important industrial chemicals in the Argentine Republic by private plants is distributed approximately as follows: Sulfuric acid, 8,000 to 10,000 tons; muriatic acid, 150; nitric acid, 75; carbon bisulfide, 1,800; and sodium sulfate, 1,000. A plant formerly producing 200 to 300 tons of tartaric acid was closed recently but plans for production of this chemical on a larger scale are being considered. Crude ammonia water is produced by two small local plants, whose outputs in 1927 and 1928 were 450 and 4,060 tons, respectively.

A plant for the production of bone black, glue, muriatic acid and by-products, which has been in operation about one year near Buenos Aires, is considering expansion of its facilities. La Cellulosa Argentina, a new million-dollar firm backed by Italian capital, recently established a plant at Rosario, to manufacture quality paper products from flax and wheat straw. Chlorine and caustic soda, for their own consumption, will be produced in their electrolytic plant.



U. S. Dept. Commerce

Argentine Chemical plant producing methyl alcohol, acetic acid and acetone.

The principal water supply for the larger cities of Argentina comes from three rivers, which are heavily loaded with sediment. During the World War, the country realized the necessity of being independent of foreign supplies of alum. In 1917, accordingly, a plant

was built by the Government for the production of aluminum sulfate in liquid form sufficient for supplying the needs of Buenos Aires. About 35 tons (solid basis) are produced daily. For interior cities the supplies of this chemical are imported in solid form, chiefly from Germany. In 1923 a 30-ton-per-day sulfuric-acid plant was built, producing 55° B. strength, to supply the sulfate component in making aluminum sulfate. Since then a 60-ton acid plant has been built as well as a new alum plant of corresponding capacity; the old alum plant being held in reserve for emergency use.

In addition to the 15,000 tons of acid produced by the two Government plants, about 8,000 to 10,000 tons are available annually from commercial sources, for use in oil refining, pickling iron and steel, and for storage batteries. Minor quantities are used in tanneries and textile and packing plants.

There are 26 distilleries, with a total output of 21,796,194 liters of alcohol, of which nearly 20,000,000 liters are from molasses and the balance from cereals. The 23 plants producing denatured alcohol use "methylen," imported from Europe. Purchases of this material amounted to approximately 600,000 paper pesos annually. Of the 23 plants, 16 are producing 10,000,000 liters of alcohol for fuel, varnishes, and similar uses. There are 5 plants producing 550,000 liters for alcohol vinegars, 2 plants producing 50,000 liters for chemical purposes, while 4 plants prepare it in small quantities for motors.

The production of denatured alcohol in 1900 amounted to 1,000,000 liters; 1905, 3,300,000; 1910, 6,200,000; 1920, 7,550,000, and 1925, 12,500,000 liters.

Argentina is the largest market in South America for industrial chemicals and imports approximately \$6,000,000 worth annually. The most important among 61,000 potential industrial consumers are meat-packing, quebracho, flour, dairy, textile, glass, soap, and brewing establishments. Sodium and calcium compounds comprise the largest import items. Copper sulfate, some of the barium salts, and alums also are comparatively heavy imports. Sodium nitrate is imported chiefly for industrial purposes.

The large quantities of caustic soda and soda ash brought in are largely for the production of glass bottles, soaps, and other cleaning materials, and for the textile and tanning industries. Between 1925 and 1929 sodium silicate imports increased from 6,085 to 10,865 tons. About 60 per cent is supplied by Great Britain and 30 per cent by Germany. Most of this chemical is used in Argentina for the manufacture of soap and a waterproofing compound.

Chlorine, for water purification, is imported by the sanitary works department, Buenos Aires, for distribution to the various municipalities. All purchases are made by bids. Local trade estimates place the annual imports of chlorine at approximately 90 tons, of which the United States furnishes about 80 per cent.

With the development of the local industry, imports of sulfuric acid have declined considerably. Imports in 1929 amounted to only 45 metric tons, as compared with 330 tons in 1924. Germany and Belgium supply most of this acid. Acetic acid comes principally from Germany.

The following table shows the imports of industrial chemicals into Argentina in 1927, 1928, and 1929:

Argentine imports of principal industrial chemicals

Item	1927	1928	1929
	Metric tons	Metric tons	Metric tons
Acetone.....	34	21	23
Acetic acid.....	689	770	600
Carbon dioxide.....	135	124	258
Boric acid.....	265	344	256
Hydrochloric acid.....	89	93	102
Nitric acid.....	98	7	8
Sulfuric acid.....	78	88	45
Tartaric acid.....	1,012	1,428	1,937
Hydrogen peroxide.....	96	96	106
Formaldehyde.....	74	47	50
Aluminum sulfate.....	1,932	3,302	4,009
Sulfate of iron and aluminum	820	1,220	891
Potassium aluminum sulfate.	897	231	203
Ammonia (anhydrous).....	982	688	1,033
Ammonia carbonate.....	186	160	102
Ammonia chloride.....	571	956	802
Ammonia water.....	52	32	29
Ammonia sulfate.....	48	66	45
Arsenic, white.....	337	283	249
Barium carbonate.....	707	247	33
Barium sulfate (crude).....	968	2,385	3,276
Barium sulfate (precipitated)	56	33	195
Calcium carbide.....	6,291	6,704	6,858
Calcium chloride.....	5,173	4,491	6,734
Copper sulfate (crude).....	2,472	3,378	2,049
Phosphorous sesquisulphide..	73	80	78
Glycerin.....	57	55	83
Iron oxide.....	932	1,293	1,594
Magnesium carbonate.....	282	70	82
Magnesium chloride.....	216	37	142
Magnesium sulfate and chlorate	610	438	476
Manganese peroxide.....	63	55	45
Potassium bichromate.....	81	121	242
Potassium carbonate.....	68	63	86
Potassium chlorate.....	201	55	28
Potassium hydroxide.....	84	46	17
Potassium nitrate.....	151	112	75
Potassium sulfate (crude)....	14	363	4
Sodium bicarbonate.....	1,153	798	1,102
Sodium bichromate.....	168	129	183
Sodium bisulfite (crude).....	512	1,169	1,586
Sodium borate.....	15	20	190
Soda ash.....	22,530	24,562	27,409
Sodium phosphate.....	36	31	66
Sodium hydroxide.....	8,826	12,454	13,016
Sodium hyposulfite.....	561	367	374
Sodium nitrate.....	2,092	3,572	838
Sodium silicate.....	7,305	7,852	10,865
Sodium sulfate (crude).....	2,234	3	907
Sodium sulfite (crude).....	28	31	42
Sodium sulfide.....	1,228	721	584

Sulfur Consumption

Argentina consumes about 13,000 tons of sulfur annually. During the past year, over 95 per cent of

the requirement was estimated to have come from the United States. Of the total imports about 600 tons are refined and the balance crude. While some sulfur is refined locally by the principal importers, there is no actual production of sulfur in Argentina, either from pyrites or other ores. Although Argentina is said to have deposits of pyrites and of crude sulfur in the Provinces of Mendoza and Cordoba, the high



The Future King of England and his younger brother relax momentarily during their South American Tour

freight rates make it impractical to develop this source of supply. About 40 per cent of the sulfur consumed in Argentina is for sulfuric-acid production; 30 per cent for sugar refining; approximately 10 per cent for insecticides, carbon bisulfide, and sheep dip (lime sulfur); and 5 to 10 per cent for disinfecting wine vats and similar uses in the wine industry.

For years American naval stores have dominated the market. During 1930, however, Spanish rosin imports have been rather important, and larger shipments than usual arrived in December. It is reported that a large quantity of Spanish rosin has been held for future delivery. Prices are said to range about 20 per cent under current quotations of American sales agents. There is, nevertheless, a decided preference for United States rosin, and it is thought that the present situation is temporary, and has been brought about by an unusually heavy production in Spain, combined with more favorable exchange conditions. Rosin consumption also is affected by the more extensive use of tallow by soap makers, because of its low price. Rosin imports amount to about 20,000,000 kilos per year.

Turpentine imports amount to about 2,000,000 kilos per year and come almost entirely from the United States.

In connection with the competitive situation in the Argentine it is significant to quote from a letter sent by John A. Benn from New York and published in the February 28, 1931 issue of THE CHEMICAL AGE. "In view of the serious decline in the United States exports to Argentina, referred to in THE CHEMICAL AGE last week, I gather that the British

Exhibition is viewed with some apprehension. It is realized that the comparative strength of our position there will be further improved and that the tour now being made by the Prince of Wales is the best possible preparation for this great national enterprise."

In the light of this statement it is important to reprint a summary of chemical imports into Argentina for the years 1928 and 1929, showing the foreign sources of supply. THE CHEMICAL AGE (February 21, page 167). The merest glance through the list indicates the latent possibilities that exist in South America and how little we have taken real advantage of our opportunities at least in the heavy chemical division.

Chemical Imports

	1928	1929
	Kilos	
Sulfate of aluminum.....	3,301,661	4,009,969
Germany.....	1,955,813	1,243,524
Sweden.....	916,091	1,562,000
United Kingdom.....	120,322	265,162
Ammonium chloride.....	955,802	802,247
Germany.....	763,495	715,744
United Kingdom.....	105,345	71,552
Ammonia, anhydrous.....	688,065	1,033,410
United States.....	452,879	624,869
Germany.....	224,133	2 65,602
United Kingdom.....	8,163	136,689
Calcium carbide.....	6,704,398	6,858,220
Sweden.....	3,379,899	3,011,589
Norway.....	2,172,678	1,665,619
France.....	479,856	301,807
Italy.....	97,269	1,050,279
Copper sulfate.....	3,777,595	2,049,307
United States.....	1,889,011	1,033,537
United Kingdom.....	967,953	813,374
Sheep dips.....	11,155,085	11,301,842
United Kingdom.....	9,494,864	9,690,941
United States.....	1,091,207	1,184,603
Caustic soda.....	12,454,243	13,016,079
United States.....	4,324,489	5,432,993
United Kingdom.....	7,235,239	6,754,036
Sodium carbonate.....	24,561,945	27,409,420
United Kingdom.....	19,526,859	19,871,422
Japan.....	3,157,068	4,670,791
United States.....	679,884	1,038,703
Germany.....	781,244	943,548
Sodium nitrate.....	3,572,339	838,002
Belgium.....	102,750	441,096
Germany.....	172,007	201,945
Chile.....	3,159,506	56,096
Sodium silicate.....	7,852,456	10,865,069
United Kingdom.....	3,818,454	5,443,195
Germany.....	3,052,554	3,840,834
Belgium.....	176,465	1,121,535
Aniline dyes.....	445,812	556,942
Germany.....	250,864	257,864
United States.....	113,113	210,063
Switzerland.....	60,870	68,767
White lead.....	242,389	266,898
United Kingdom.....	139,000	190,128
United States.....	30,792	11,608
France.....	—	25,790
Paints in paste.....	4,068,000	3,193,510
United Kingdom.....	2,849,695	2,263,994
United States.....	561,832	546,649
Netherlands.....	369,637	183,131

Paints, liquid (enamels).....	1,617,662	1,506,296
United States.....	922,336	919,498
United Kingdom.....	391,284	313,044
Germany.....	83,679	100,238
Paints—liquid in general.....	1,100,438	1,242,874
United Kingdom.....	696,777	556,777
United States.....	301,404	575,550
Varnishes.....	1,084,534	835,978
United States.....	447,987	373,042
United Kingdom.....	484,394	333,455
Turpentine.....	1,576,270	1,615,747
United States.....	1,427,907	1,506,841
United Kingdom.....	94,586	55,666

American Zinc Institute Meets

The annual convention of the American Zinc Institute will be held at St. Louis, April 20 to 22. The following committee has been appointed to nominate candidates for the board of directors: Alton D. Zedes, Edward C. Hegeler and L. G. Johnson. The directors whose terms expire this year are Arthur E. Bendelari, the Eagle-Picher Lead Co., Chicago; James A. Caselton, St. Louis Smelting & Refining Co., St. Louis; Frank Childress, Skelton Lead & Zinc Co., Joplin, Mo.; A. P. Cobb, the New Jersey Zinc Co., New York; Alexander J. McKay, Matthiessen & Hegeler Zinc Co., LaSalle Ill.; Charles T. Orr Athletic Mining & Smelting Co., Joplin Mo.; William N. Smith Vinegar Hill Zinc Co., Platteville, Wis.; Leland E. Wemple, Illinois Zinc Co., Chicago, and Eugene H. Wolff, New Chicago Mines Corporation, Joplin, Mo.

The nominating committee of the Chicago Drug and Chemical Association has reported to the association the following nominations for consideration by the members at the annual meeting. President, Mr. O. H. Raschke; vice-president, Mr. Wm. O'Neill; secretary, Mr. Joseph P. Sullivan; treasurer, Mr. M. B. Zimmer. Directors—Term of two years: Mr. W. B. Behrens, Mr. A. C. Drury, Mr. O. M. Krembs, Mr. A. J. Rocca.

The Purchasing Agents' Association of New York were guests of the Pyrene Manufacturing Co. at Newark on March 18. A luncheon was served at the main plant of the company, after which C. G. Durfew explained the uses of pyrene and the thirty-six types of fire extinguishers made by the Pyrene company.

The New York Wax Importers' Association held its regular monthly meeting on March 18 at the New York Athletic Club. George O. Elmore of Smith & Nichols is president; A. H. Hoffman, Strohmeyer & Arpe, vice president; E. Sievert, Frank B. Ross, secretary, and W. F. Leary, treasurer.

Horace Freeman of Montreal has been awarded the Bruce gold medal by the Canadian Institute of Mining and Metallurgy. The medal, donated by Hon. R. Randolph Bruce, Lieutenant Governor of British Columbia, is given annually to the person who, in the opinion of the institute council, makes the most noted contribution in the field of practical mining, metallurgy or geology to the mining industry in Canada.

According to the annual report of the obligatory Sicilian Sulphur Consortium, sulphur production from August, 1929, to July, 1930, inclusive, totalled 246,955 tons. This represents about 7 per cent increase over the 1928-29 production, and follows a similar increase during 1928-29 compared with 1927-28. Stocks of sulphur with the Consortium on July 31, 1930, were 58,868 tons, compared with only 35,288 tons at the close of the year 1928.

The I. G. is now producing an artificial sponge for the market under the name of "Agfa-Viscose." The raw material is provided by reclaimed cellulose.

Bromine Markets Broaden and Deepen

With the introduction of "ethyl gas" in 1923, bromine became an industrial chemical requiring mass production methods. Now, world production is larger than consumption, and France and Germany have entered into a cartel to control quotas. What effect will this have on the industry in this country?

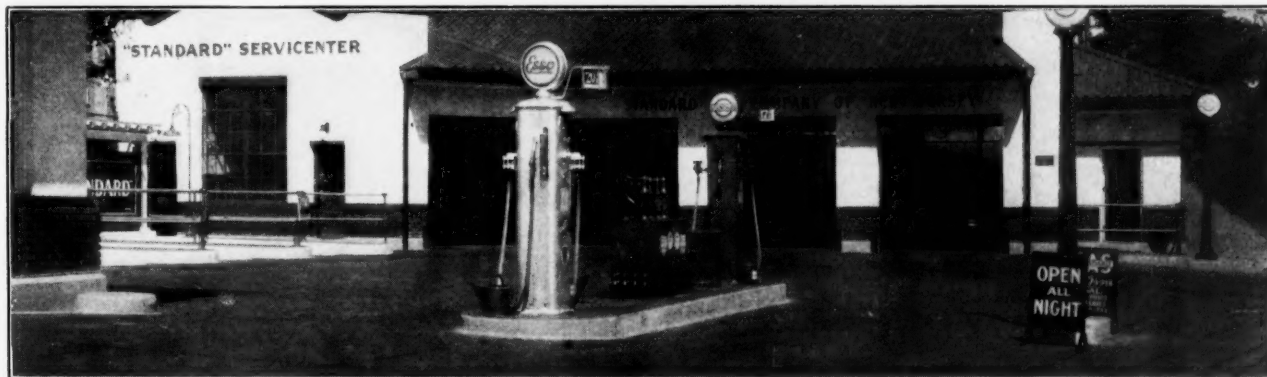
CONFIRMATION of the recently proposed Franco-German bromine agreement has reached this country, and while the exact terms of the arrangement are yet to be divulged, specially the export quotas to be allowed, it is safe to predict that the cartel will exert considerable influence on the international market.

Bromine has received a great deal of attention in the past few years under the impetus of the motor demand which requires large quantities in the form of ethylene dibromide for the manufacture of anti-knock compounds. We think of this as a purely American development, but the French industry has expanded at a very high rate, the bromine output for 1930 amounting to 620 tons, as against only 230 tons three years previously. The total production in Germany in 1929 was said to be about 1800 tons.

Previous to the commercial introduction of ethyl gasoline in 1923, the production and consumption of bromine showed little variation from year to year although, naturally, the tendency was upward. The principal use was in the manufacture of the bromides prepared for the photographic and medicinal fields. Production in this country was scaled to these needs.

With the introduction of "ethyl gas" the demand arose suddenly for unheard of quantities and production, both here and abroad, proved for the time being to be entirely inadequate. Producers set about correcting this situation and production schedules were expanded. Some let-up was noted in the demand when several of the larger localities temporarily halted the sale of "ethyl gas" until the health hazard was thoroughly investigated. However, the lull was of but short duration.

An interesting angle to the expansion of the bromine industry in the United States occurred in 1924 when the duPont Co., in conjunction with the Ethyl Gasoline Corp., undertook to determine the commercial practicability of extracting bromine from sea water. These companies were vitally interested in the production of bromine and were possibly afraid that the domestic manufacturers would be unable to increase production sufficiently for future needs. A vessel, poetically christened the S. S. Ethyl, was outfitted as a chemical plant and spent several months at sea producing bromine. The equipment was scaled to treat approximately 7,000 gallons of water a minute and the estimated bromine content of which was



Over two billion gallons of "Bromine-treated" gas were used in 1930

determined to be between four and five pounds. However, it was soon evident that, even though from an engineering viewpoint the process was entirely feasible, it could not hope to compete economically with the existing methods of manufacture, and the project was shelved.

In France and Germany the production of bromine is a by-product of the potash industry. In this country, production is closely associated with the salt industry. Two general processes are being utilized here, the first obtaining bromine after the common salt has been removed and the other by the direct treatment of the brine before the salt is removed. Three methods are in commercial use at the present time: a process using sulfuric acid and an oxidizing agent; a continuous process involving the use of chlorine; and a third in which the electric current is employed. These three processes are briefly reviewed by Tyler and Clinton of the U. S. Bureau of Mines in information circular 6387 as follows:

Three distinct methods have been employed commercially, namely (1) a batch process using sulfuric acid and an oxidizing agent; (2) a continuous process involving treatment with chlorine gas; and (3) another continuous process in which an electric current instead of chlorine is employed to liberate the bromine.

In the first-mentioned process the bitters after the salt has been removed are concentrated further and then treated in a sandstone or chemical stoneware still with a calculated quantity of sulfuric acid and sodium chlorate (or other oxidizing agent such as manganese dioxide). A steam jet passed into the solution assists in eliminating the bromine in the form of a gas which passes out of the still. Impurities, chiefly chlorine, are removed by washing the gas with milk of lime, after which the bromine is condensed.

In the chlorine process air is employed to remove the liberated bromine from the solution, and the resulting mixture of air and bromine is passed over scrap iron or iron filings, forming iron bromide. Sufficient moisture is present to dissolve this compound, and the concentrated solution of iron bromide so obtained is treated with more chlorine. This once more liberates the bromine which (being only slightly soluble in the iron-chloride solution which is simultaneously formed) settles to the bottom of the chamber and can be withdrawn.

The electrolytic process depends upon the principle that bromides can be decomposed at a lower temperature than

chlorides, which consequently need not first be removed. The liberated bromine is carried out of the brine by means of air and purified, as in the second process described above.

The continuous processes have been covered by numerous patents; and for some time the Dow Chemical Company, the largest producer of bromine in the United States, had a practical monopoly of their use, but this condition no longer exists.¹

Production Figures in the United States

Production figures for the past five or six years reflect the remarkable growth in the demand in this country. For example, the increase in 1924 over 1923 amounted to 141 per cent. In 1925 there was a loss of 25 per cent brought about by the temporary ban on tetraethyl lead in many communities. However, the advance has continued since then at rapid strides. In 1928 consumption was 23 per cent above the previous year and the jump in 1929 over 1928 was of much greater importance as is seen from the following statistics:

Marketed Production of Bromine in the United States²

Year	Quantity Pounds	Value	
		Total	Per lb.
1913	572,400	\$115,436	\$0.20
1914	576,991	203,094	1.35
1915	855,857	856,307	1.00
1916	728,520	951,932	.31
1917	895,499	492,703	.55
1918	1,727,156	970,099	.56
1919	1,854,971	1,234,969	.67
1920	1,160,584	745,381	.64
1921	711,953	172,759	.24
1922	1,005,174	150,668	.15
1923	842,352	146,176	.17
1924	2,033,804	594,685	.29
1925	1,566,130	488,406	.31
1926	1,245,760	426,837	.34
1927	1,759,000	564,760	.32
1928	2,164,000	649,475	.30
1929	6,414,620		

¹Dow Chemical Co. v. America Bromine Co., and Arthur E. Schaefer, 210 Mich. Sup. Ct. Rep., 262.

²Includes bromine content of potassium and sodium bromides. Data compiled by A. T. Coons, U. S. Bureau of Mines.

The original Dow Chemical Company Bromine plant (1900). On the opposite page the present unit



Our chief supply of bromine and bromine compounds prior to the work of the late Dr. Herbert H. Dow at Midland, Mich. in the late eighties, came from abroad, and it was under his direction the first step was taken towards emancipation from foreign control our bromine market. Subsequently, as other companies entered into the production of bromine and bromine compounds, the import figures showed serious declines and the country was producing very close to its actual requirements until the new demand in 1923. Bromine in a sense ceased to be strictly a fine and medicinal chemical and became overnight an industrial material in such demand that mass production methods were required. The time required to fill the gap while this transition took place permitted foreign material (almost wholly from Germany) to again regain a serious foothold in the country and for several years the tendency of the import figures was upward. With 1929 a change occurred and domestic producers are very close to, if not fully, able to take care of domestic requirements.

The present cartel between Germany and France is merely a revival. There have been several similar agreements in the past. Both countries are well able to produce much larger quantities than their present home consumption can adequately absorb. Specially is this true of France where as yet permission is still to be gained for the use of tetraethyl lead in gasoline. It is felt in several quarters in this country that the present arrangement has dealt chiefly with the division of the continental business and will not affect this country seriously.

Naturally as the production volume has increased the price has lowered. The last decline in bromine occurred in January, 1930, when the price was promptly met on a competitive basis by all factors. It would seem that there is little necessity to resort to the sea for our bromine supplies at least for several years. The brine wells underlying the Midwestern section of the United States apparently are sufficiently rich in bromine content to guarantee our independence without establishing chemical plants on the high seas.

Another angle to a somewhat muddled situation is the uncertainty as to how long ethylene dibromide will be required for the gasoline industry. Because of the health hazard involved, a great deal of research effort is being made to find a less dangerous substance with similar properties. While some progress has been reported from time to time the fact remains that to date nothing has been found just satisfactory for the purpose. That of course, is no guarantee for the future.

Increased Bromine Demand

Except for this possible substitution of one product for another, the outlook for the further expansion of the bromine industry is very bright. Statistics released by the Ethyl Gasoline Corp. show that 1930 was a record year despite depression and poor business.

Consumption totalled nearly two billion gallons of ethyl-gas compounds, a reported gain of 42 per cent over 1929. The outlook for 1931 appears to be even more promising with several additional large gasoline distributors now licensed. The present number of licensees total ninety-seven and ethyl gasoline is sold at nearly 200,000 outlets in 40,000 cities and towns. Surveys show that one in every five pumps is now dispensing ethyl gasoline. It is a rather difficult



Today the United States is almost entirely free of foreign domination in the bromine industry

problem to translate into exact figures the total amount of ethylene dibromide used in the manufacture of ethyl gas. The difficulty lies in the fact that the amount required is not always the same, that required to treat California gas is different from Texas gas. However, this figure can be approximated. It is said that the "average" treatment is made with 3cc of lead and approximately one-half as much of ethylene dibromide. Based on these figures the production of two billion gallons of gas last year consumed in the neighborhood of 2,015,418 pounds of ethylene dibromide or expressed in terms of bromine, 1,713,000 pounds.

A direct effect of this growing popularity of ethyl gas has been felt in the market for benzol blends—but, as Kipling says, that is another story.

A plant for the production of calcium cyanamide is under construction at Karakliss, Russia at an estimated cost of 8,000,000 rubles. The initial capacity of the plant is to be 10,000 tons of cyanamide and present plans contemplate doubling the capacity upon completion of the installations of a nearby hydro-electric plant.

The thirty-sixth general meeting of the Deutsche Bunsen Gesellschaft für Angewandte Physikalische Chemie, the leading association of research workers, scientists and technologists in the important field of applied physical chemistry will take place from the 25th to the 27th of May 1931, in Vienna. The subject of the symposium will be: *Recent progress in the science of metallurgy with particular reference to light metals*. The arrangements have been undertaken by Geheimrat Prof. Dr. Dr.-Ing. h. c. Specketer, Director of the I. G. Farbenindustrie A.-G., Managing Director of the Griesheim Elektron Works.

Dividends Through Research

The duPont lacquer patents direct attention to the monetary return to be derived from continuous and sustained research.

DUPONT COMPANY'S recently proposed terms of a license agreement with lacquer manufacturers has focused public attention on this industry. Because of this interest it is timely to study the production figures in the nitrocellulose industry for the past few years, and the possible return this particular piece of research work will bring to the owner of the patents.

Contrary to general belief the lacquer industry was not born in the past ten years. Nitrocellulose lacquers were discovered and used to a very limited extent for many years previous to the turn of the century. However, it was not until the commercial production of butyl acetate (by the fermentation process) during the war that the necessary solvent for the industry on a large scale was available.

The output of nitrocellulose lacquers in the United States has more than doubled during the past four years. Figures just released by the Bureau of the Census show that the total production in 1927 amounted to 18,496,000 gallons valued at \$45,908,800. In 1929 these figures had increased to 23,978,000 gallons valued at \$57,391,800.

If the duPont Company patents covered the entire field of nitrocellulose lacquers its income would be increased by something like \$740,000 annually, based on the 1929 production figures and the four cent royalty per gallon asked pending the final action validating the patents. Production for 1930 is not as yet known, but it is reported that consumption was considerably under the 1929 figure due to the curtailment of business, specially in the automotive field. This decline in all probability will be of short duration and the production curve will again start upward.

It is reported that the DuPont patents do not cover the entire output of nitrocellulose lacquers, that the patents deal specifically with nitrocellulose of low viscosity only. The exact proportion of nitrocellulose of low viscosity to the total volume of lacquer pro-

duced is impossible to determine. In the solvent field it is generally thought that the figure would be between one-half and one-third of the total production of nitrocellulose lacquers.

Assuming that the amount is one-half then the income to be derived based on 1929 figures would be approximately \$370,000 a year on the four cent royalty basis and \$555,000 on the six cent basis. These figures are conservative and should be greatly exceeded in but a very few years, providing the growth of the lacquer industry continues at the rate it has during the past five or six years.

Should these patents be registered and sustained in foreign countries as well as here the return to the patentee would, of course, be enhanced; but not to the extent that might commonly be supposed. The three leading countries in production are England, France and Germany. England's volume is estimated at only 2,000,000 gallons annually and France's at 475,000 gallons. While German volume is not definitely known, it is thought to be about equal to that of France. Compared with the United States, production and consumption in these countries is of little importance. As to the status in other countries export figures of lacquer shipped from the United States indicate that production in the remaining countries is negligible, at least for the present.

From these approximate figures it is readily seen that between \$500,000 and \$1,000,000 annually is involved in the question of the duPont nitrocellulose patents. As one of the prominent men in the field recently remarked, "You can hire a lot of legal talent for a half a million dollars." This of course applies with equal force to both sides. At least the announcement of the duPont interests has served to illustrate quite forcibly the wisdom and the possible cash returns to be derived from extensive and sustained research.

Plant Management

A Department

Devoted to the Business Problems of Chemical-Process Production

Unit Costs

OUT of the bitter experience of greatly curtailed chemical consumption is coming a new conception of some of the most important elements in production costs.

ADMITTEDLY, chemical costing is extremely intricate and at the same time highly flexible; so that while our production figures have a very direct bearing upon the competitive position of our companies, nevertheless they may be very easily juggled. In this way a great uncertainty is introduced into the very foundations of our chemical price structure.

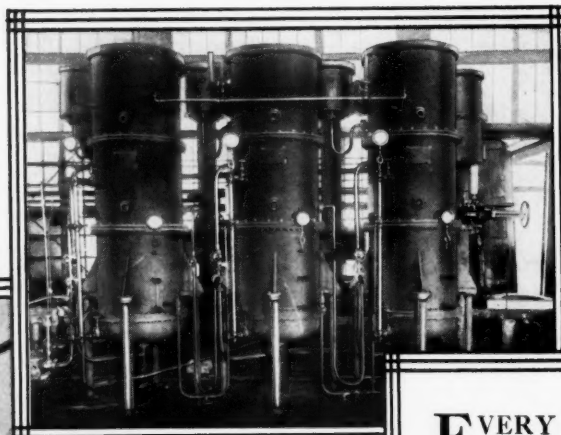
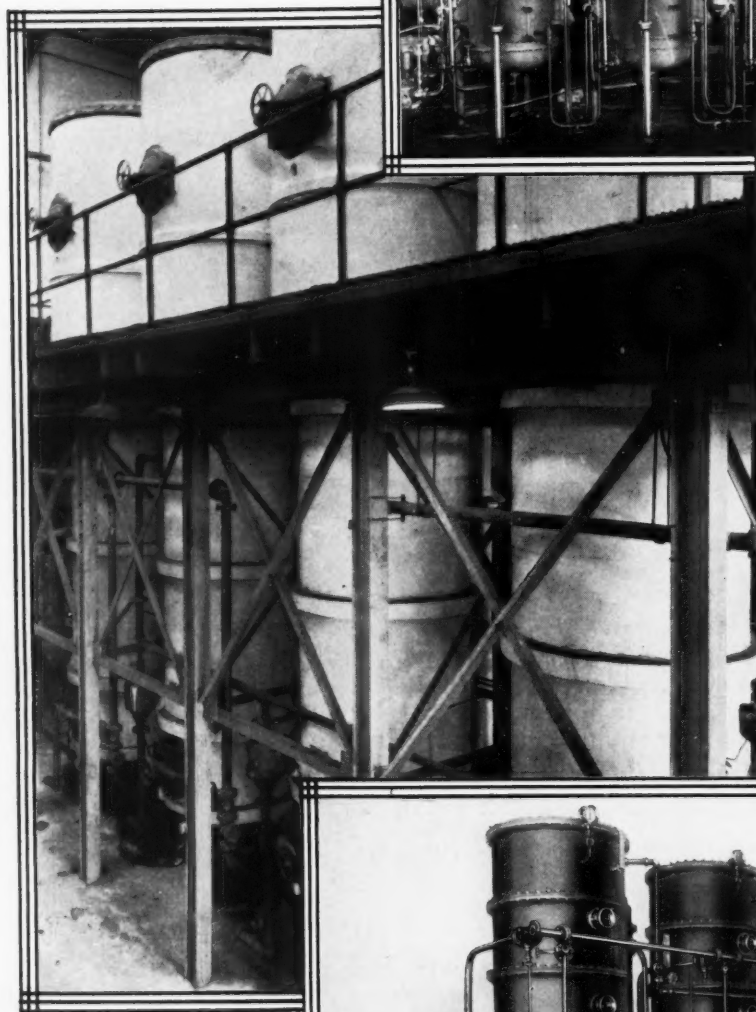
OF LATE years, special emphasis has been placed upon the economy of large scale chemical production. But our big units are proving very unwieldy under existing conditions and call attention to themselves in a way that prompts critical examination of certain elements of chemical costing which have been glossed over during the days of mass output. Such studies as have recently been carried on by the Economics Department of the

Massachusetts Institute of Technology are stressing not the cost per pound, but the profit per dollar invested. This is a very different matter, and involves such charges as the carrying costs of inventory and of idle or semi-idle plant.

SUCH inquiries naturally raise another question that is proving embarrassing to the advocates of large scale operations: Is the return on the investment commensurate with the risks involved in the enterprise? Chemical plant is expensive. Often it deteriorates rapidly. Inherently its obsolescence is high. Investment in vast units, if evaluated solely upon the cost per pound of their output, is risky unless the future schedule of operations can be guaranteed above the danger line below which costs rise unreasonably. These considerations bring great comfort to the executives of our smaller plants—if their management is efficient. To the department managers of our larger companies—no matter how efficiently operated—they suggest some clear thinking and close figuring. To both groups this will be a healthy experience.

Evaporation

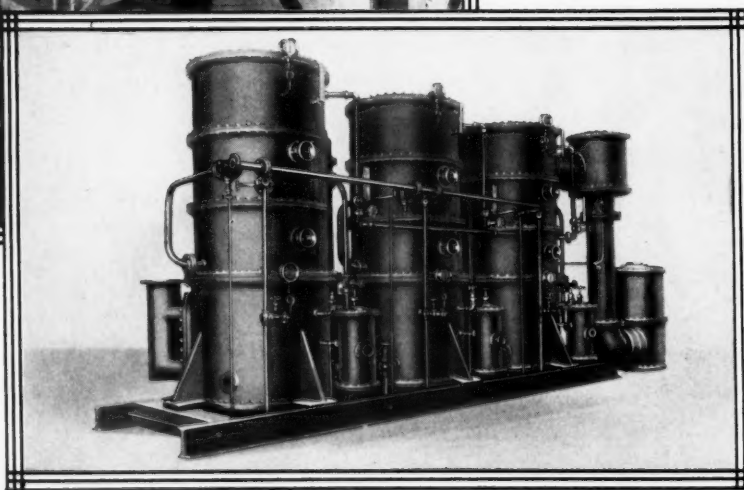
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By L. Staniforth*

Cost Elements In Chemical Manufacture

At a time when prices are at the lowest point since the World War it is essential that correct accounting practices be employed. But what are they? So many articles on cost accounting as applied to the chemical industry are superficial, and not sufficiently definite to warrant serious consideration. L. Staniforth, for years accountant for one of the largest British chemical companies, understands the chemical and engineering problems of the chemical plant. His cost accounting systems are thoroughly practical in their viewpoint.

NUMEROUS branches in the chemical industry make it impossible to lay down hard and fast rules in regard to costing, such as are possible, say, in a machine tool works, but an endeavor will be made to describe the principles of systems actually adopted in various chemical works.

The word "costing" as applied to the chemical trade means not only the ascertainment of the monetary cost per unit, but it also implies the more important function of checking the individual efficiencies in the process of materials from the raw state to the finished product. "Costing," therefore, in the chemical trade has a wider meaning than in most industries. The bookkeeping side of cost accounts may be obtained from standard text books and, therefore, this paper will be confined to work problems relating to the costs and statistics of the chemical industry, which are only gained by experience.

The branches of chemical manufacture which will be dealt with are:—

1. Distillation Processes, such as the fractionation of crude gas or coke oven tar into several finished products.
2. Heavy Acids—Sulfuric, nitric and hydrochloric acids.
3. Alkali Manufacture.
4. Gas manufacture—e.g. SO_2 and CO_2 gases.
5. Fine Chemicals.

Under these headings some principles are common to all, and it is with these principles that I will commence, in the following order: Raw materials; steam production and consumption; electric power; labour;

repairs and engineers stores; plant records, plant efficiencies; product sheets; overhead charges; general remarks.

Raw Materials

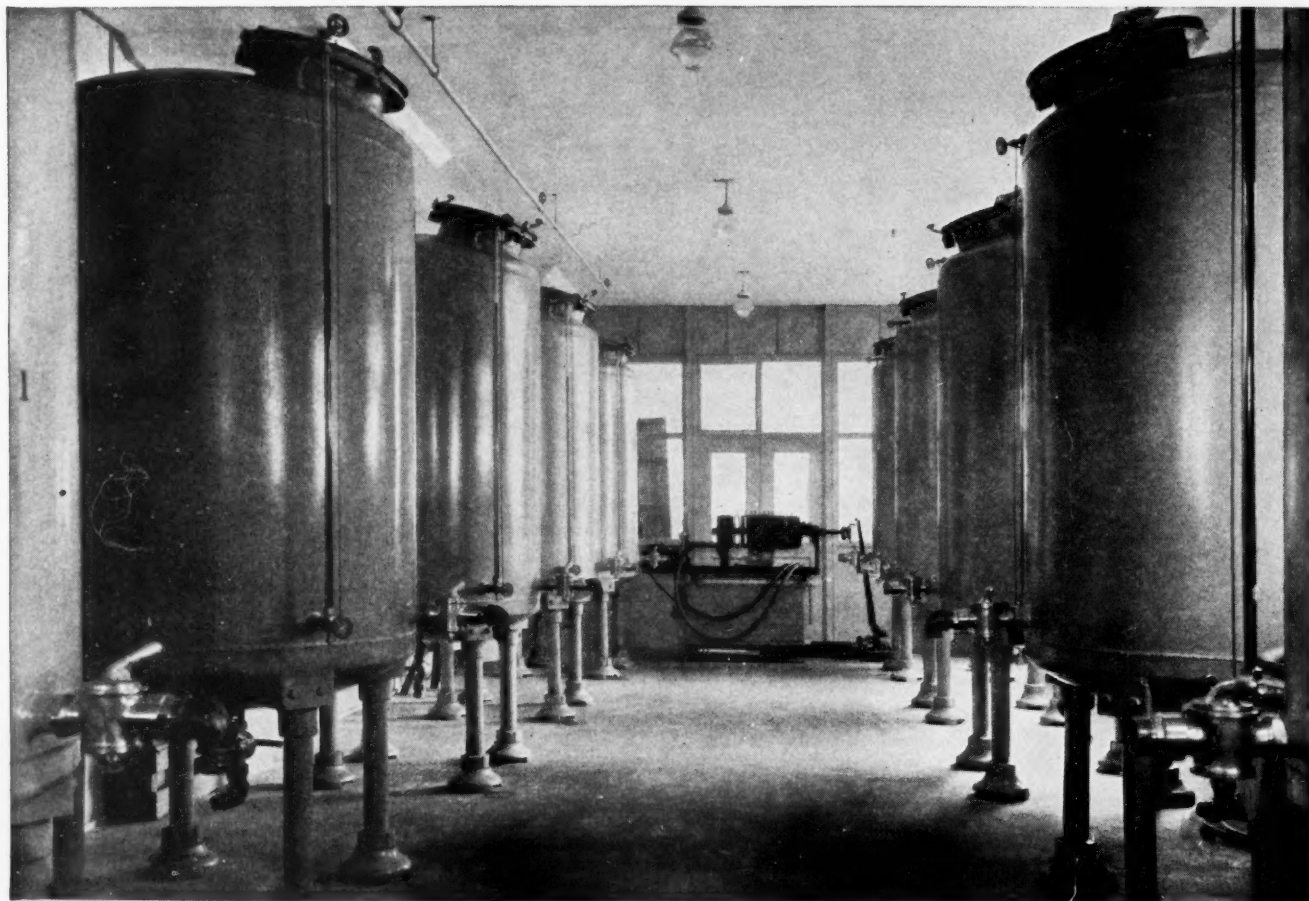
The records of raw materials received, used, and in stock are in some ways identical with those of any other industry. Chemical raw materials should be recorded on their constituent values, and not necessarily on the gross weight actually handled, although for calculating the handling cost the latter weight should be noted. Examples of these constituent values are:—

- (a) Brimstone, Spent oxide or pyrites for sulfuric acid manufacture should be shown as actual sulfur content in addition to the gross weight.
- (b) Crude carbolic and cresylic acids as dry acids, i. e. with the percentage of water deducted.
- (c) Ammoniacal liquor as received from the gas works as absolute ammonia gas.
- (d) Methylated spirits as the absolute alcohol content.

As these raw materials are purchased from supplies and charged to the various processes in terms of their useful base (i. e. Sulfur in spent oxide) it is necessary for each consignment to be carefully sampled and tested in the laboratory before being entered in the Raw Materials Stock Ledger. **CORRECT SAMPLING IS VITAL**—as unless the quantity sent for testing is representative of the bulk, the records are useless, and trouble will arise in the checking of the suppliers invoices and arriving at the quantity to be charged to the process concerned.

*Cost Accountant to Brotherton & Co., Ltd.

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If raw material be received in bulk, care should be taken that the sampling apparatus employed is so constructed as to ensure the sample being obtained from the top to the bottom of the truck, bag or container etc. For this purpose special bulk samplers can be obtained. In sampling liquids, a clean tube sufficiently long to reach from the top to the bottom of the tank or drum should be used, and the sample thus obtained emptied into a clean receptacle which should be securely corked to prevent the escape of any volatile matter. Non-representative samples can cause endless trouble in connection with the recording of chemical quantities.

Control of Raw Materials

It is not considered good practice for the raw materials store to be under the sole care of the plant superintendent or processman actually using the commodity, as it has occasionally been found that in order to show a high plant efficiency over a period, a larger quantity of material has been used than has actually been booked to the process. This, of course, would eventually be detected when the stock of the particular raw material became low, but, in the meantime, the management would have been misled by the false efficiency.

Wherever practicable it is considered to be more economical to store raw materials in a compound or shed in charge of a storekeeper. This employee is the medium between the works office and the plant superintendent, and is responsible for:—

1. Correct quantities being received from suppliers.
2. Representative samples being sent to the laboratory for testing in order to confirm suppliers invoices.
3. Correct quantities handed to processmen.
4. Stocks.

It may be said that in the case of liquids in bulk, e.g. sulfuric acid for the manufacture of hydrochloric, this procedure would not be practicable, but, if the liquid store tanks be properly calibrated the actual quantities may be ascertained by the differences in dips as easily as a commodity can be put over the weighing machine.

Making Calculations

It will be observed that the dip sheet is calibrated in volume, i.e. gallons. If the charge records are required in weight the volume should be calculated to weight by the use of the specific gravity. Where the process has been more or less standardized it is the storekeeper's duty to hand to the processman similar quantities each day or period as the case may be. Requisitions, signed by the process foreman or plant superintendent should be sent to the storekeeper showing the materials required for particular batches.

A specimen is shown in the next column.

Specimen Dip Sheet

Store Tank No.										Size of Tank.									
Contents.										Total capacity . . . gals.									
GALLONS																			
Feet	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"						
1																			
2																			
3																			
4																			
5																			
6																			

Specimen Requisition

RAW MATERIALS USED

Product.		No.	
Date.		Plant.	
Batch No.	Description of Material	Weight	Lbs. or galls.

Signed.

The storekeeper is, therefore, responsible to the management for the accuracies of the quantities on hand, and it is an advantage to be able to produce the book figures of the stocks on demand. Of course, differences between the actual and book stocks will occur but if proper records be kept it is a much easier proposition to check discrepancies.



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about losses that "blush unseen" in the balance sheet

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¢ The cost of steam or power used in the manufacture of your product may be a fraction of a cent . . . insignificant. Often in reducing the cost of a single product it doesn't count, yet at the end of a year's operation, power losses that "blush unseen" in the balance sheet aggregate thousands of dollars . . . in the red instead of in the profit column.

% It's safe to say that you haven't overlooked many opportunities to cut the cost of your product . . . yet power—a definite part of your overhead—has not contributed its share to profits.

\$ In such cases the value of the outside viewpoint cannot be over-estimated. Why not investigate the "dollars and cents" value of a Steam Plant Survey and Report by Austin Engineers? Their analytical engineering experience has prov-

en very helpful in exposing hidden losses. This service will show you the degree of efficiency of your present facilities. It will tell you what savings can be effected and how. It also will answer the question . . . to buy or not to buy your power.

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Where raw materials are received in large bulk such as the brimstone used in the manufacture of sulfuric acid, the store should be a heap in a storage shed. Endeavour should be made to keep each receipt of the same raw material separately and thus be able to compare the actual and book figures for each consignment. These remarks refer to the quantitative values of the materials, but the cost accountant should keep a stock account of each commodity, showing the quantity and invoice value on the account, crediting the various quantities charged to the process, as ascertained from the requisitions in the storekeeper's possession.

By these means, in addition to being able to produce the book figures of the quantities of raw materials in hand at any time, it is possible to prepare, in a very short time, the actual stock values of the various materials in the works. Of course, the book stock quantities should be reconciled periodically with the actual stocks. All trucking and handling charges in connection with the receipt of raw materials should, of course, be debited to this stock account.

Steam Production and Consumption

Steam costs are a big factor in the manufacture of chemicals. The checking and recording of the costs under this heading may be divided into two sections:— (a) The cost of producing the steam. (b) The economical consumption of the steam after it has been produced.

The cost of producing the steam is usually expressed as the "cost per 1,000 gallons of water evaporated." It is, therefore, necessary to have some accurate means of recording the quantity of water evaporated into steam and the following two methods have been found to give reliable data in this respect:—

1. A Lea recording instrument. 2. The provision of two large tanks for the storage of the feed water. The tanks are calibrated in gallons and the water is fed to steam boilers from the tanks alternately. By this method no confusion arises as to the feed water storage tank outlet and inlet pipes being open at the same time.

The date required to ascertain the cost of producing steam is:—

1. Gallons of water evaporated. 2. Cost of feed water. 3. Cost of materials for water softening plant. 4. Tons of fuel used. 5. Average price of fuel delivered at boilers. 6. Total cost of fuel. 7. Stokers' wages. 8. Cost of repairs. 9. Depreciation. 10. Cost per 1,000 gallons water evaporated. 11. Pounds water evaporated per lb. of coal used.

Item No. 11 is the figure used by the works engineer to check and compare the efficiency of the steam boilers but, of course, this figure varies with the calorific value of the fuel used. The cost per 1,000 gallons of water evaporated is a most interesting figure for the works manager.

Before passing to the checking of the consumption of the steam, a few notes as to the value of mechanical

devices used in connection with steam raising would, perhaps, be of interest. It may be thought that such matters are directly and only concerned with the engineer, but it can be stated with assurance that if economies are to be affected a general knowledge of engineering and chemical problems is a necessity to a cost accountant in the chemical industry.

Fuel Economizers. Consist of an arrangement of cast iron pipes, connected to boxes at the top and bottom through which the cold feed water is passed on its way to the boilers. The object of the economiser is to heat the feed water passing through it by the waste heat in the furnace gases after they have left the boiler flues. It will be obvious, therefore, that less fuel will be used to evaporate the warmer water into steam than if the cold water were fed direct to the boilers and the flue gases wasted.

Mechanical Stokers. The use of mechanical stokers in place of hand firing is frequently advantageous where there is an extensive battery of boilers or where there is any difficulty in obtaining satisfactory firing. The initial cost, however, is considerable and all mechanical stokers require skilled supervision, otherwise the anticipated gain may not be obtained.

CO₂ Recorders are instruments which register on a chart the percentage of CO₂ in the flue gases and thus control the combustion of the coal in the boiler furnace. The air admission affects the proportion of the gases in the products of combustion, and at some steam plants the percentage of oxygen is also recorded.

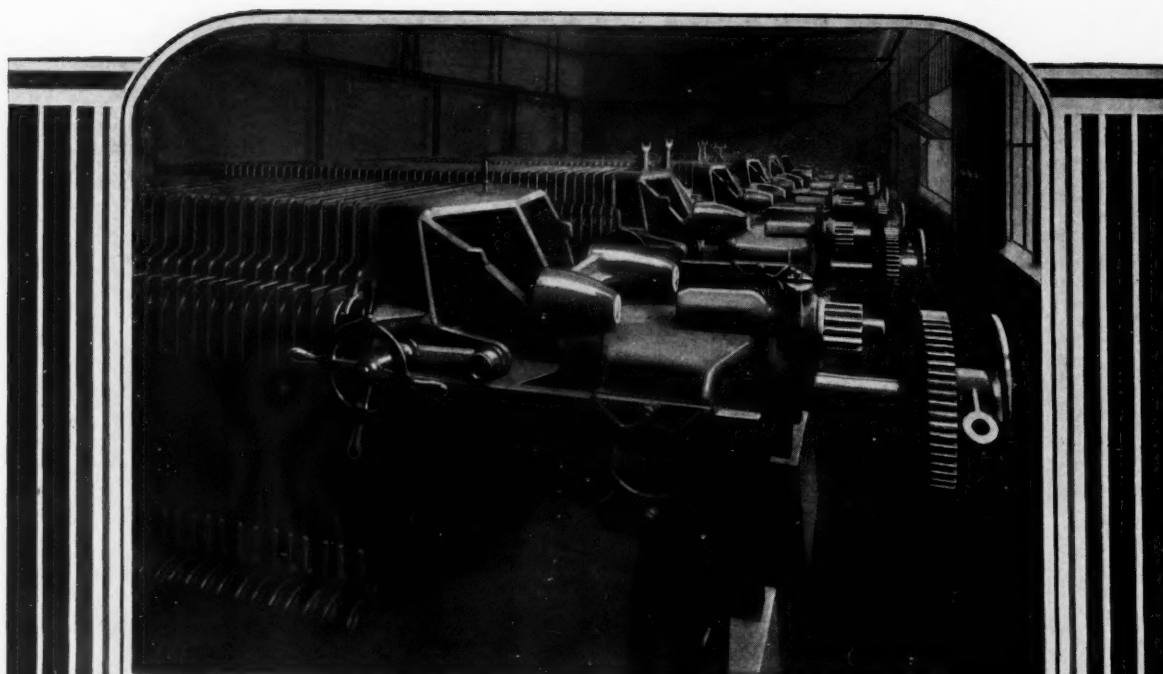
Water Temperature Recorders make a dual permanent record on a chart of the temperature of the feed water entering and leaving the economizer and thus check the working of the feed water pre heating system.

Gas Temperature Recorders show the dual readings of the temperatures of the hot flue gases entering and leaving the economisers.

Steam Pressure Recorder, which is self explanatory.

The proper use of all these mechanical aids assists the management to economize in the cost of the production of steam. The checking of the economical consumption of steam in a works where this power or heat is used at various parts of the works calls for careful consideration, but the following method is in use successfully, at several chemical works.

As it is not possible to arrive at the amount of steam used, by the process of elimination, the works engineer determines the quantity of steam used per hour in each of the processes, together with the quantity of through-put during that period. This is ascertained— (1) by means of a portable steam meter or (2) by condensing the exhaust steam at the particular process and calculating back to gallons of water used per unit of production.



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The cost of producing steam per 1,000 gallons, and also the normal cost per unit of production at each stage is thus obtained.

To illustrate this procedure a specimen is necessary and for this purpose the distillation of tar from the crude raw material up to refined products has been taken. The cost of producing steam, shown by the account previously described may, for the purpose of this example, be assumed to be 30/-per 1,000 gallons of water evaporated, which is equivalent to 0.036d per lb. of steam. The quantity of steam used at each stage has already been ascertained, and the figure calculated to the cost per unit of normal production or consumption, as the case may be.

The monthly steam accounts at a Tar Works will, therefore, be as follows:

Stages	Unit of Production with Allowance	Allowance Steam		
		£	s	d
Receiving of Tar	2,369 tons @ 2d per ton,	19	14	10
Tar Stills	2,863 tons dist. @ 4d, per ton	47	14	4
Fire Oil Stills	68,963 galls. dist. @ 0.016d, per g.	4	11	11
Vacuum Oil Stills	23,694 galls. dist. @ 0.123d, per g.	12	2	10
Carb. Extraction	24,926 gals. extr. @ 0.836d, per g.	86	16	6
Pyridine Extr.	236 gals. extr. @ p. 213d, per g.	4	2	
Whizzed Nap.	74 tons made @ 1/-per ton	3	14	0
Naphthas Rectd.	32,341 gals. made @ 0.275d, per g.	37	1	2
Fitting Shop	Per month (arrived at by calculating of capacities of various machines)	15	0	0
Office & Laboratory Heating	Per month	5	0	0
Total allowance for steam		231	19	9
Actual cost of steam		274	3	6
Excess Cost		42	3	9
Excess cost equivalent to:		18.2%		

This method may be adopted for any plant having several processes. The cost per 1,000 gallons of water evaporated checks the efficiency of steam production, and the percentage excess cost (or saving) brings to light variations in steam consumption. Of course, the unit allowances vary with the cost of producing steam each period.

It is usual to have cost accounts for each department and the aforementioned account shows that the excess steam cost is 18.2% above the allowance. The charge for steam in the departmental account would be increased accordingly:—e.g.

	£	s	d	
Tar Stills (as above).....	47	14	4	4.00 per ton of tar
Plus 18.2% excess.....	8	13	4	0.73 do
Steam Costs charged to each particular account.....	£56	7	8	4.73 do

Electric Power

In modern chemical factories electric power is gradually superseding steam for the driving of pumps, air compressors, etc. The allocation of this power is a

much easier proposition than that of steam, as meters record the units of power used in each department. Where recording meters are not installed in each department the capacity of the motor is known and the units of electricity consumed can be calculated from the time worked.

In the concluding article, to appear in the May issue, the remaining factors of cost accounting are taken up in detail in a similar manner to the method Mr. Staniforth has employed in discussing steam production, electric power, and labor.

Equipment Bulletins

The Duriron Co. has just issued Duriron centrifugal pumps, Bulletin No. 164.

The Brown Instrument Co., has issued a catalog on Brown Electric Co., indicating and recording meters, Catalog No. 3004.

The Fulton Sylphon Co. has mailed to the trade bulletin describing the positive elimination of Uneven, injurious and wasteful heat for factories and plants through the use of automatic radiator valves.

Raymond Bros. Impact Pulverizer Co. has issued an interesting booklet summarizing Raymond equipment built and installed in 1930.

Foot Bros. Gear & Machine Co. has issued a leaflet describing a new oil leak proof vertical worm reducer specially designed for chemical, paint or food plants.

The Adalet Manufacturing Co. has prepared a leaflet describing a new line of vapor-proof conduit wiring fittings.

Meriam Co. has issued a leaflet explaining a U-tube of novel design for measuring pressure or flow of any liquid.

Bakelite Corp. has recently published a very complete booklet on Bakelite synthetic resins for quick-drying durable finishes.

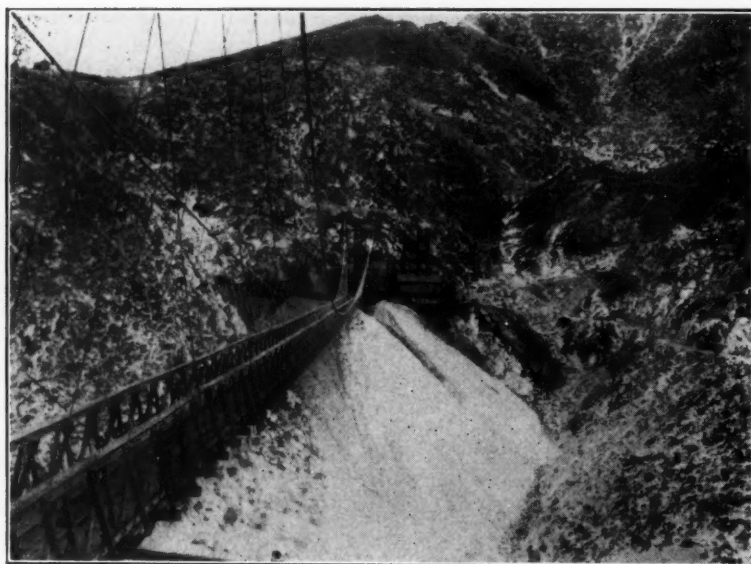
The Plant Management Department of Chemical Markets will be glad to forward requests for the above booklets to the proper channels for attention.

Chemical Exposition

Four hundred and fifty or more exhibits will fill three spacious floors of Grand Central Palace, when the 13th Exposition of Chemical Industries opens the week of May 4th to 9th. These displays will illustrate scores of phases and ramifications of the vast industries that are dependent in their operations upon a chemical change in the nature of the material, or are under chemical control. Among the numerous layouts will be raw materials, chemicals, machinery, boiler room equipment, including refractories, gauges, automatic control and other precision instruments, and laboratory equipment, besides a list of equipment and supplies hardly to be classed under any of these heads.

The exhibits of the various types of chemicals and machinery will allow the visiting engineer and executive to compare at first hand the various types of materials, equipment and chemical practices with many new features exhibited for the first time. Of particular interest to chemistry teachers from academies and high schools will be the conferences on Tuesday, Thursday and Friday afternoons, on the problems of teaching chemistry.

William H. Zinsser, William Zinsser & Co., was elected president of the United States Shellac Importers' Association, at the annual meeting of that organization at the Downtown Club in New York City.



Of cost necessity, neglected by the chemical engineer, silver's present low price is attracting attention. Donald McDonald explains here in the paper read before the Chemical Engineering Group of the Society of Chemical Industry, London, the properties of silver that are of interest in the chemical plant. Above, a large silver mine in Mexico.

Silver As a Chemical Engineering Material

By Donald McDonald, B. Sc., F. I. C.

THE recent changes which have taken place in the economic position of silver, and particularly their influence on its price, make it highly desirable to examine the properties of this metal in order to see if it can be made use of in the construction of chemical plant. Until a few years ago silver was definitely classified as bullion. More recently it has been used in making small pieces of chemical apparatus, usually for the handling of difficult organic acids; the peculiar reaction of its haloid salts to light has ensured the employment of large quantities in the photographic and cinema industries; and the many valuable properties of the silver solders are well recognized in both ferrous and non-ferrous industry.

But its great uses, apart from ornamental goods, have been in the form of bullion and specie—bars and coins. That latter use is now coming to an end, since even the East has adopted, or is about to adopt, new standards. The consequent fall in value has brought it within the reach of ordinary consumers, and has enabled it to take its place among the economic metals. It is still rather expensive, perhaps (through the autumn of 1930 it stood at about 21s. per lb.), but not more so than other new economic metals, such as beryllium, so that it becomes a question of how desirable are its properties and those of its alloys, and what the trend of its price is likely to be in the future.

Already its employment in industrial chemical plant is reaching appreciable dimensions, and pieces of apparatus weighing up to 3 or 4 cwt. have been, and are being, made from the pure metal, most of them for handling acetic acid. This indicates that the first use of pure silver in plant construction depends upon its resistance to organic acids, particularly in the preparation of foodstuffs.

The present century has seen developments in metallurgy such as were undreamt of years ago, with the result that ores of such poorness and complexity that they were formerly neglected are now worked up by cheap and efficient methods which ensure the marketing of every metal they contain. Silver and the precious metals frequently occur in such ores in very small quantities, often little more than traces, but the metallurgical methods of to-day are such that all these small quantities are collected, and in the bulk represent very respectable and increasing output. Therefore, large quantities of silver are coming automatically upon the market as by-products in the production of metals, such as lead, copper, zinc, and nickel—metals for which there is sufficient continuous demand to ensure the permanency of the operations concerned in their production. This silver is practically independent of any price fluctuations in the market in which it is sold. Under the above conditions, manipulation of the price becomes increasingly difficult, and it should now conform more and more to the same laws as affect other commodities, so that it may be regarded as available for any purpose to which we care to put it.

Before discussing the physical properties of pure silver it is necessary to deal with a phenomenon which is capable of affecting some of them seriously, and which is so peculiar as to be almost unique in commercial metallurgy. This is the power of absorbing large quantities of oxygen when in the molten state—most, but not all, of which it disengages on solidification. There is minimum solubility (0.087 vols. of oxygen in one vol. of silver) about 400° C., and maximum (20 vols.) just about the melting point (960° C.).

The effect of this property on the physical and mechanical qualities of the metal will be obvious. If the circumstances of pouring the molten silver have not permitted the complete removal of the dissolved gas, the casting will contain blowholes, or even be spongy. Further, as a certain amount of gas remains in solution even after solidification, the physical properties of the specimen are bound to vary somewhat with the casting conditions and the extent or efficacy of any previous deoxidation treatment.

Such deoxidation easily enables sound castings to be produced by experienced hands. A layer of charcoal on the surface of the molten metal for a few minutes before pouring is enough for most practical purposes, but if complete removal of all dissolved gas is necessary, any of the deoxidizers employed in ordinary non-ferrous practice are effective, although some of them introduce an impurity into the metal. In casting the ordinary commercial open-mould ingots the deoxidation is not always carried to its limit, and gas is disengaged on solidification of the last portions of the bar. Small blisters, called the "spit," are formed on the surface as the gas is liberated. Its presence formerly was taken as indicating a high purity of the metal, as the presence of small quantities of base metals would effectively suppress it by combining with the oxygen, but nowadays "spit" is not encouraged, as it leaves parts of the metal in a friable state and liable to be rubbed off. The high-quality ingot of to-day is therefore frequently thoroughly deoxidized, and is perfectly flat and smooth.

The presence of oxygen makes very little difference on the chemical properties of silver, although the presence of extraneous oxidizing matter or of nascent oxygen is able, under certain conditions, to accelerate corrosion considerably. The effect on the mechanical properties is very serious. In any melting or other operation involving a temperature approaching the melting point, great care has to be taken to avoid the entrance of oxygen into the metal, because if it is allowed to enter there will inevitably be embrittlement on cooling down. Fortunately, those who are skilled in handling and working in silver are well acquainted with methods of preventing the ingress of the gas, but trouble is certain to occur if operations like brazing, soldering, or welding are carried out or attempted on pure silver by the unskilled. The whole business is on all-fours with the maintenance of the oxygen-balance in copper, or of the austenitic structure in the corrosion-resisting chrome-nickel steels.

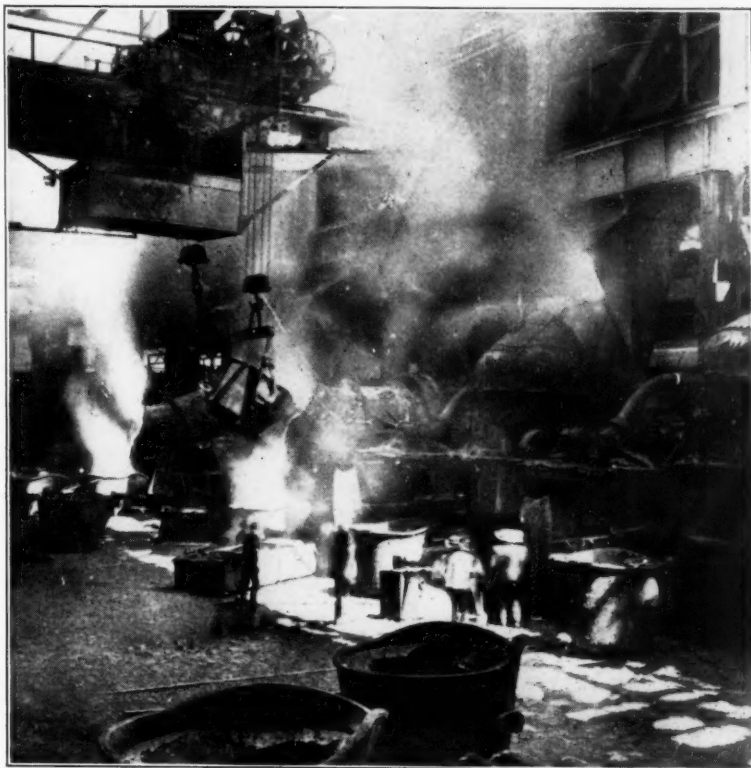
The specific gravity of silver has been found to vary between the wide limits of 9.6 and 10.5, according to the history of the sample examined; values differing, for instance, according to whether the metal

was quenched, annealed, or subjected to work beforehand. Further, according to some authorities, the figure differs with different methods of reduction of the metal from its compounds. These phenomena have been so widely observed that they cannot be doubted, but so far no satisfactory explanation of them has been forthcoming. The most hopeful theories are that they indicate the existence of fairly labile allotropic forms of the metal, or else that its content of oxygen is responsible.

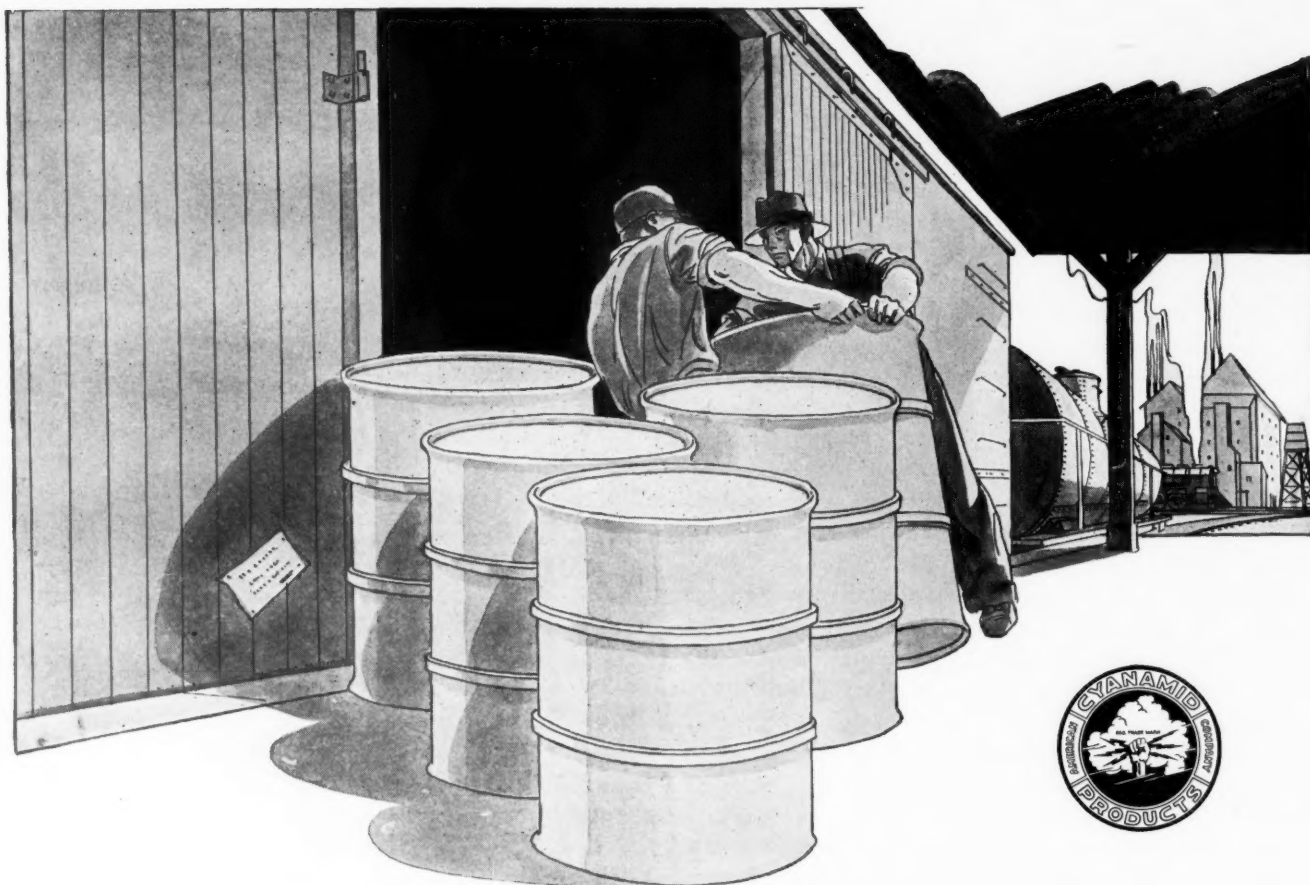
Pure silver is comparatively soft, being harder than gold, but not so hard as copper, its hardness on the mineralogical scale of Mohs being given as 2.5 to 3. This is not sufficient to withstand much wear, so all through its history it has been hardened by the addition of copper. When, however, it is employed in chemical work, it is the pure metal which most often has to be considered. The coefficient of expansion of silver is about halfway between the extremes of lead and platinum, slightly higher than copper and considerably higher than nickel and iron. The specific heat is low (0.05) compared with copper (0.09), iron (0.10), and aluminum (0.20). Its thermal conductivity is higher than that of any other metal. A table of the relative conductivities of various metals, taking silver as 100, is shown below:—

Ag—100; Cu—91.2; Au—69.6; Al—47.7;
Zn—26.3; Sn—15.6; Ni—14; Pb—8.4.

Its electrical conductivity is also the highest of all the metals. The following list gives absolute figures in ten-thousands of reciprocal ohms for some of the commercial metals at ordinary temperatures: Ag—67; Cu—58; Au—47; Al—39; Zn—16; Ni—7; Pb—5.



Large scale silver refining methods at Cerro de Pasco, Peru



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Ethyl Oxybutyrate
Formic Acid
Hydrocyanic Acid (Liquid)
Nitrocellulose

Red Prussiate of Potash
Rezyls
Rezyl Balsams
Sodium Cyanide
Sodium Phosphates
(Di and Tri)
Sulphocyanides
(Thiocyanates)

Sulphur
Sulphuric Acid
Teglac
Thiourea
Urea
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Yellow Prussiate of Soda
Zinc Cyanide

Industrial Chemicals Division

American Cyanamid Company

535 Fifth Avenue New York

Annealed silver is more electropositive than hardened silver, and the importance of this lies in the possibility of the commencement of electrolytic corrosion in silver apparatus which has not been evenly annealed.

The melting point of silver can be taken as $960.5^{\circ}\text{C}.$, but this may be lowered by several degrees if oxygen has access to the molten metal. The molten metal is appreciably volatile at temperatures between $1000^{\circ}\text{C}.$ and $1500^{\circ}\text{C}.$, while above the latter temperature the vapour pressure increases rapidly. The volatility at lower heats is increased by the presence of certain impurities such as zinc and arsenic, and to a greater extent by selenium. Pure silver possesses greater malleability and ductility than any other metal except gold, and therefore is easy to work. For general purposes the tensile strength (maximum stress) of annealed and deoxidized pure silver should be taken as 7 tons per sq. in., and its elongation about 60 per cent.

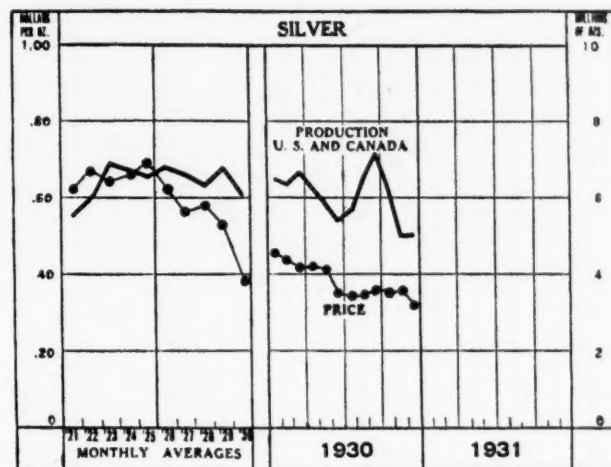
Oxygen, whether dry or moist, has no chemical action on fine silver at any temperature up to the boiling point of the metal. Ozone is stated to blacken its surface, but I have had no opportunity of confirming this. There is no evidence that either water or steam at any temperature below the decomposition point of the latter has the slightest effect on the fine metal. Above that point more or less decomposition takes place through heat alone, oxygen is absorbed, and spitting takes place on cooling.

The halogens all attack silver to a greater or less extent, depending on temperature, the presence of moisture, and other circumstances. Frequently, however, the coatings of insoluble chloride of silver produced by solutions of chlorine are very hard, and can only be removed from the metal by means of abrasives or strong solvents such as sodium cyanide. In these cases attack ceases as soon as the coating has become thick enough to be protective, and silver therefore might be used in the presence of a halogen.

The extent to which dry hydrogen chloride free from oxygen attacks silver is doubtful, but when mixed with air the metal is quickly covered with a violet coat of silver chloride. Strong hydrochloric acid attacks silver slowly at a rate depending on the temperature and on the presence or absence of oxidizing agents. If the latter are present the attack is much more marked, as conditions are favourable to the production of nascent chlorine. A piece of silver completely immersed in strong (36°Tw.) commercial acid lost weight at the rate of 0.208 grammes per sq. metre per hour at ordinary temperatures, and at five times this rate at the boiling point. In this acid the metal remains perfectly bright, the silver chloride dissolving as fast as it is formed, and the attack is therefore progressive. The same acid diluted with four times its volume of water gave no measurable loss of weight in 19 hours at ordinary temperatures, but on boiling the loss was at the rate of 0.443 grammes per sq. metre per hour. The same rate of corrosion occurred on boiling with stronger acid (1:1). On adding

to each solution 10 per cent by volume of 10-volume hydrogen peroxide, and immersing the metal for 16 hours at room temperature, there was a gain in weight of 2 mg. in the stronger acid and 9 mg. in the more dilute, showing that attack had taken place in each instance, but that the silver chloride formed had dissolved to a greater extent in the stronger acid.

The neutral halides, such as sodium chloride, sodium iodide, ferrous chloride, etc., very slowly attack silver in the presence of air, but a protective film is



*Silver is at the lowest price that has prevailed for many years**

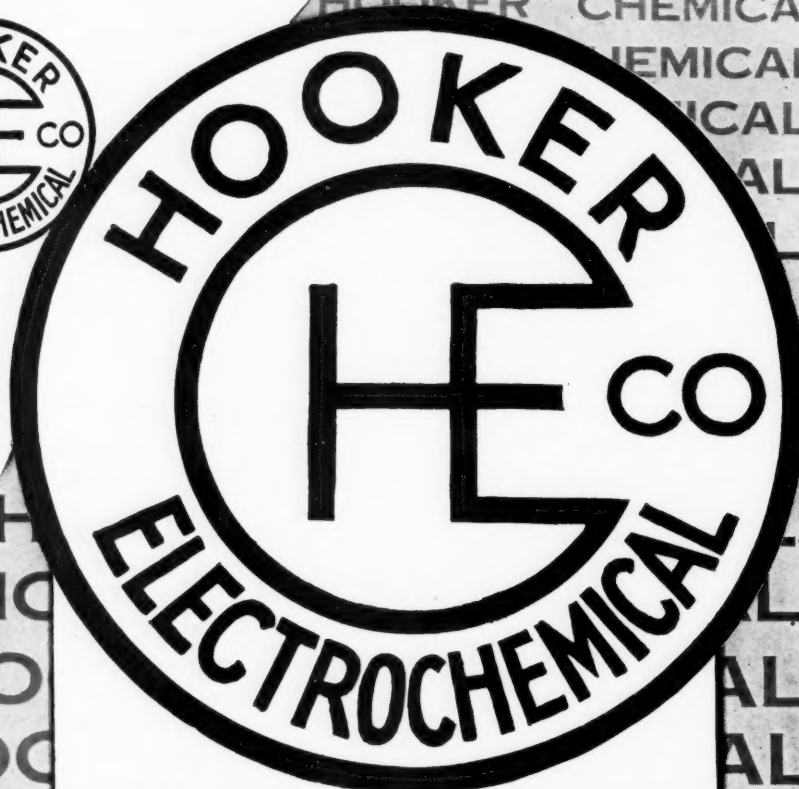
soon formed in all cases except where silver chloride can go into solution. With the higher chlorides, such as cupric chloride, ferric chloride, and mercuric chloride, the attack is naturally more marked, but the same conditions apply regarding protection.

Solutions of the caustic alkalis are without action on silver, and in the solid form they can be melted and cast safely in vessels made of it. If, however, the fused alkali is left in the molten state in contact with both the metal and air for a long time (say, six hours), the melt takes on a slight yellow tinge, which has been ascribed to the presence of silver oxide. We have not been able to detect any loss in the weight of the metal. If, however, oxidizing agents, such as sodium nitrate, are present in the melt, there are some signs of attack, but no loss of weight was noticed. Liquid ammonia is stated to have no action on silver, but we have not examined this. Ammonia solution (sp. gr. 0.880) caused a slight loss of 0.022 grammes per sq. metre per hour during a 10 hours' exposure at room temperature, increasing to 0.044 on a further 15 hours' trial. Solutions of cyanide, of course, attack silver freely in the presence of air or oxidizing agents.

The action of sulfuric acid on silver is very interesting, for at room temperatures neither the dilute nor the concentrated acid has any appreciable effect unless oxidising agents such as ferric sulfate or hydrogen peroxide are present, when a loss of weight becomes apparent, but on boiling, the dilute acid has some action. With acid of sp. gr. 1.355 (45.4 per cent, H_2SO_4) kept at its boiling point, $123^{\circ}\text{C}.$, and with its dilution maintained by the addition of water,

*Journal of Commerce, N. Y.

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the loss was found to be at the rate of 0.794 grammes per sq. metre per hour. Hot concentrated acid dissolves the metal freely and rapidly with evolution of sulphur dioxide and formation of silver sulphate, the action beginning relatively suddenly at a certain point of concentration and temperature. Unless the acid is sufficiently concentrated the metal will only dissolve at a rate comparable to that found for dilute acid. Rapid action commences about 265° C., and sulphur dioxide is freely evolved between that temperature and 270° C. To attain this temperature the acid must be about 1.8 in specific gravity, or about 85 per cent of H₂SO₄. With stronger acid the temperature can be raised further, and the action becomes more rapid.

The most extensive application to chemical plant evident so far is in the condensation and general handling of acetic acid, which is particularly corrosive at the moment of condensation. This may be due to the co-operative action of finely divided acid and oxygen, and has given very great trouble to manufacturers who usually used copper condensers. Many of these have now been abandoned in favour of silver, with, as far as I can hear, entirely satisfactory results. Some of these are large pieces of plant weighing several hundred-weights, and are of both the tubular and the coil types, the tubes being welded or, if not too large, seamless solid drawn. The heat transmission is excellent, and, on account of its superior thermal properties, a silver condenser can be considerably smaller than a copper one designed to do the same work.

The use of silver is spreading to other allied trades, and so to the food industries. In the distilled vinegar industry the use of copper, even when tinned, has not yielded universally satisfactory results, and trouble has occurred when the vinegar made in it is employed as a pickling medium. Fine silver stills and condensers, and silver-alloy taps and cocks are being generally employed to overcome the manifold troubles experienced in these particular industries. In other food-preparing trades silver has found various relatively small uses, although in most of them the concentrations of acid handled are such as can be expressed only in terms of pH. For instance, in the milk, cider, and brewing trades it is used for siphons, pipe lines, pasteurizing coils, and the nozzles of filling machines. There is no evidence that the metal is in any way soluble in the liquors concerned, but in any case silver is inert physiologically, and we can assume with a certain amount of confidence that it will also be inert biologically, a point of very great importance to the industries, which are based on the work of micro-organisms.

In the manufacture of acetate silk fine silver condensers are utilized in the recovery of solvents; while the organic solutions employed require valves, cocks, and taps made from silver alloys. The viscose industry, on the other hand, is not a congenial home for silver on account of its sulphurous nature. In

the manufacture of synthetic acetic acid, silver is used as a catalyst in the form of fine wire mesh to promote the oxidation of ethyl alcohol to acetaldehyde. It is also used in the distillation of phenol.

Not only is the pure metal used and, to a less extent, its copper alloys, but also what is known as *doublé*, in which fine silver sheet is rolled on to copper or other base metal, thus reducing the first cost of the apparatus. Pipe lines can be made in this way by drawing a tube of the base metal over a seamless tube of silver, the combination being sufficiently strong to withstand complete vacuum without separation. The outer tube can be made of suitable thickness to stand high internal pressures. Coils for heating corrosive liquors also can be made in the same way, but with the silver outside. Small vessels can be made of the *doublé* sheet quite satisfactorily, but with larger sizes jointing difficulties rise which rather limit its application.

Another method of obtaining some of the valuable properties of silver without its cost is to coat copper or other vessels electrolytically, but this is not very satisfactory for chemical processes, since the coating has frequently weak patches and pores, and is so thin that stirring or the mere movement of the contents created by boiling removes it in course of time. It is, however, used in plant for jam-making by some firms, and seems to give satisfaction. Solid homogeneous silver linings can be obtained for existing vessels which are not subject to vacuum, provided that their construction is suitable, and where silver-plated have given poor results, lined vessels have been found to give good service.

In inorganic chemical processes the present uses of silver are less evident than in organic ones. The mineral acids generally attack it, and there are many more alternative metals available which cannot be used in the organic processes. There is no reason why it should not be used in handling cold hydrofluoric acid of all strengths, dilute sulphuric acid up to the limits mentioned above, dilute hydrochloric acid provided the protective coating of silver chloride is not removed, and other substances indicated in the section on the chemical properties of the metal.

For the melting and casting of the caustic alkalis, silver apparatus is employed, and stands up to its work well. An application of silver which has some slight connection with chemical engineering is in the Drumm storage battery. This is an alkaline electrical accumulator which, it is claimed, has much higher rates of charge and discharge than one found with any other known type and a much greater capacity per unit of weight.

The sales of the German potash industry in 1930 are reported as amounting to 1,356,000 tons. Despite the depression this was only 45,000 tons less than the previous year. The receipts, including those for by-products, amounted to £12,250,000. Some forty pits were active throughout the year to about 70 per cent of capacity.

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Apr. '31: XXVIII, 4

Chemical Facts and Figures

Borax Consolidated (British) Enters American Potash Industry—Preliminary Negotiations Start Toward New Nitrogen Agreement—Winkler Absorbed By Columbia Chemical—W. A. Hamann, Chairman R & H, Retires.

Interesting developments occurring in the foreign field overshadowed the domestic chemical news of the month, five countries, England, France, Germany, Italy and Canada each contributing an item of international significance. In England the decision of Borax Consolidated, Ltd., definitely to enter the potash-mining business in the United States marks a step that is of first importance. The entrance into this country is being made through the subsidiary company, of Borax Consolidated, Ltd., The Pacific Coast Borax Co. Another potash news item that is of special interest in connection with the series of articles now appearing in *CHEMICAL MARKETS*, ("Potash—Can the United States Free Itself of Its Present Dependence?") by Professor George W. Stocking, was the announcement in Germany (March 18) that the Potash Syndicate has extended its life until 1943 with quotas unchanged.

American Potash

The chairman of Borax Consolidated, the Right Hon., the Earl of Leven and Melville, speaking at the annual meeting in reference to the new acquisition stated, "Owing to the present close association between borax and potash, due to the joint production in the United States from lake brines of these two products, it became evident that the company must either develop its property at Searles Lake, California, by working the brines there, or become associated if possible with any promising development which might occur by the discovery of beds of potash ore. An opportunity was offered to the American branch of our company to take a substantial interest in an American company which was developing beds of potash ore, the existence of which had been shown by the cores from a number of boreholes spread over a large area. These beds are of very large dimensions, and are estimated by competent engineers and geologists to contain an enormous tonnage of potash ore sufficient to provide for the requirements of the United States for a very long period. This constitutes the first discovery of high-grade potash soluble in water in the form of sylvite made in the United States, and marks a very important phase of the industry. It is anticipated that a refining plant will be in operation by the end of this year, and we

should afterwards substantially benefit from the investment of our American branch in the company which has developed this enterprise."

Bright Future

R. C. Baker, managing director of Borax Consolidated for thirty-two years is quoted on the project as follows:

"I think this new investment of ours will prove to be a very important development. I was in America three months ago, and spent several days on the spot where this new property is. I think it is one of the greatest developments that have occurred in the chemical world in the United States for a good many years. We are most fortunate in 'getting in on it.' We have through our American branch a very substantial interest in an enterprise which will, I believe, be one of the biggest chemical industries in the United States."

This step will give Great Britain a place in the sun in the potash field. Her position has been quite analogous to our own and chemical interests in England have been anxious to break the control of Germany and France on the international potash industry. The *CHEMICAL TRADE*

JOURNAL (London) commenting editorially on the announcement states, "The demand for domestically produced potash in the United States is a large and rapidly increasing one, and there seems little reason to doubt that the policy of the concern will early prove to have been fully justified."

New Nitrogen Agreement

France's contribution consisted of an announcement that the preliminary negotiations toward the renewal of the world nitrogen agreement, or the "Convention de l'Industrie de l'Azote," will get under way in Paris on March 21, and the actual negotiations will be started about April 1.

The American industry will not be represented at this conference, which seeks to prolong the agreement between European manufacturers of synthetic nitrogen and the Chilean producers of natural nitrate, which expires on June 30, 1931.

I. G. and Montecatini

In Italy, confirmation was given to the earlier report concerning the joint financial interest of Montecatini and the I. G. in the "Acna" enterprise, a very large and important Italian chemical and dyestuff manufacturer. Montecatini has subscribed 31,000,000 lire and the I. G. 29,000,000 lire to the reorganized company. This action strengthens considerably the international position of both companies.

Finally several items reporting construction of chemical plants in Canada when grouped together discloses the fact that our northern neighbor is investing several million dollars in erecting facilities for the manufacture of industrial chemicals formerly imported largely from the United States and the remainder from England. The Dominion Tar and Chemical Company, Ltd. of Toronto, is erecting a plant for the manufacture of phenol at a cost of approximately \$250,000 and will begin operations in June. This will be the first production of phenol in Canada on a commercial scale. In addition, Dominion Tar & Chemical will produce orthocresol, meta paracresol, cresylic acid and various high boiling acids.

Another large Canadian company, the Consolidated Mining & Smelting Co., Ltd., has completed construction of the first unit of its chemical fertilizer plant at Warfield, B. C., between Trail and Roseland, B. C. The plant is in production and capacity is expected to be attained in the fall of 1931.

THE MONTH REVIEWED

March

- 4 "Norris Muscle Shoals Bill" defeated.
- 10 Dry Ice loses suit against Carbice.
- 12 Dinner Drug & Chemical Section, N. Y. Board of Trade sets new attendance record.
- 13 Dr. John A. Wilson receives Nichols Medal.
- 18 Columbia Chemical announces acquisition of Isaac Winkler as of April 1.
- 20 Allied's net earnings \$5,000,000 lower in 1930.
- 25 Alcohol C. D. No. 5 prices reduced to 24 cents in tanks.
- 30 A. C. S., 81st meeting opens in Indianapolis.
- 31 Alcohol prices reduced further.

Deaths

- 7 Allen W. Clark
- 17 Thomas R. Evans
- 17 William R. Peters
- 20 George L. Duval
- 21 Philip O. Schleussner
- 23 Dr. John E. Teeple

Canadian Alcohol

Considerable importance was attached to the report of the American Trade Commissioner at Winnipeg that the Canadian Research Council had perfected a process for the manufacture of alcohol from waste gases in the Alberta field. According to the statement production of 140,000,000 gallons annually is possible at a cost under 25 cents employing the ethylene process.

Officers of the research council are said to be now studying the economic possibilities of the process which has been developed. Industrial alcohol used annually in Canada at the present time is valued at more than \$2,000,000.

Obituaries

March, 1931, will long be remembered by members of the chemical industry because of the large number of very prominent men who died during the month. The names of Dr. John E. Teeple, consulting chemist, and leader in the development of a potash industry in the United States, Thomas R. Evans, president and one of the founders of the Diamond Alkali Co., and also prominent in the glass industry, William R. Peters, leading chemical merchant of an earlier era and still active as a director of Mutual Chemical Co. of America, Phillip Schleussner, vice-president of Roessler and Hasslacher Chemical Co., and George L. Duval, connected with the Chilean nitrate industry for many years, were known to everyone connected with the industry as leaders, in their respective fields. Their untimely deaths are a severe blow to the industry, specially the younger and more active such as, Dr. Teeple, Thomas R. Evans, and Phillip Schleussner.

Dr. John E. Teeple

Dr. John E. Teeple, consulting chemist and leader in the development of the American potash industry, died March 23rd, aged 57. Born in Kempton, Ill., Dr. Teeple was a graduate of Valparaiso

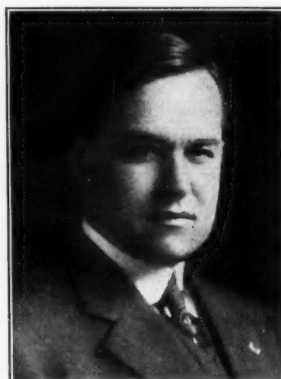


University, with a Ph. D. (1903) from Cornell, where he taught for five years prior to coming to New York as director of the Industrial Laboratories. He later

took up the work of consulting chemist and chemical engineer. Almost single-handed he built up the American potash industry, when through his research and organization at Searles Lake, California, he established the principal potash-producing firm in the country, after the many concerns which had sprung up during and after the War succumbed to the post-War competition of France and Germany. This achievement was one of the reasons why he was honored in 1929 with the Perkin medal. He served for many years as director and treasurer of the American Chemical Society, and he belonged also to the Franklin Institute, the American Institute of Chemical Engineers and the Society of Chemical Industry. He was a Consulting Editor of CHEMICAL MARKETS.

Thomas Raymond Evans

Thomas Raymond Evans, president of the Diamond Alkali Co., died March 17th, at the age of 52. A native of Pittsburgh, he entered his father's glass-manufacturing business on graduation. He was



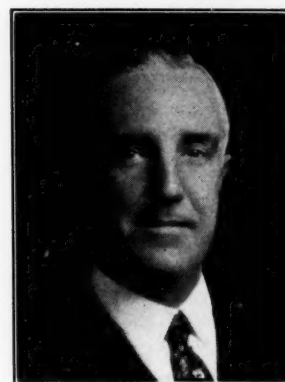
one of the organizers of the Diamond Alkali in 1910, and began with that company as assistant treasurer, rising to the position of president in 1921. He was a member of the American Chemical Society, the Chemists Club of New York, and various other organizations.

Philip O. Schleussner

Philip O. Schleussner, First Vice President and Director of the Roessler & Hasslacher Chemical Co. of Delaware with offices at 10 East 40th St., New York, died Saturday, March 21st, at his residence "Wood Acres", Stamford, Conn. He was stricken in November with bronchial pneumonia and never returned to business. Private services were held at his late residence on Monday, March 23rd, interment taking place at Woodlawn Cemetery.

Mr. Schleussner was born in Brooklyn on Sept. 6, 1878, the son of Charles and Ida Schleussner. He was educated in the public schools and after a few years in the textile industry associated himself with the Heyden Chemical Works, later leaving

their employ to take charge of the Platinum Department of the Roessler & Hasslacher Chemical Co. The latter



merged with E. I. du Pont de Nemours & Co. on May 1, 1930.

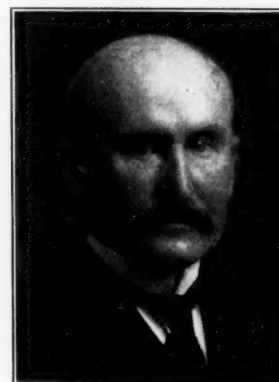
He was an official and director in the Perth Amboy Chemical Works and Mexican Roessler & Hasslacher Chemical Co., associated companies of the parent organization; also Vice President and Director of the Niacet Chemical Corporation of New York.

Mr. Schleussner was an interesting raconteur and as an ardent sportsman, maintained his own stable of horses. He was a prominent member of the Oxridge Hunt Club of Darien, Conn.

He is survived by his mother and father, his wife, the former Matilda Kaeppl of New York, a daughter, Geraldine and a son, Charles.

William R. Peters

William Richmond Peters, retired head of Peters, White & Co., died March 17, at the age of 80. One of the oldest and best-known men in the chemical trade in New York, he was the founder of the firm of Peters & Tiemann, importers of chemicals, which later became William R. Peters & Co., and subsequently Peters, White & Co. He retired from active participation in the business in 1916. Among his other business connections



were directorships in the Mutual Chemical Co. of America and the Phosphate Mining Co. He was a member of several social and religious organizations.

Washington

With both houses adjourned (March 4) and the President away from his desk, there was, naturally, a considerable let-down in activity at the Capitol. Washington for several months has been a center of interest to the chemical and allied lines because of the threat of government operation of the Muscle Shoals nitrate plants. With this danger adverted, at least for the present, attention was centered principally on the oil proration plans and action of the Tariff Commission on several matters now before it for consideration.

The Tariff Commission has also ordered an investigation of the comparative costs of production of foreign and domestic crude petroleum, fuel oil, gasoline and lubricating oils. Costs will be ascertained in all countries which exported in the aggregate, directly or indirectly, more than 2,000,000 barrels to the United States during 1929 and 1930.

Senator E. S. Broussard (La.) made a last minute attempt at the close of the last session to bring about a fuller investigation into the action of the Bureau of Mines in approving the use of methanol as an anti-freeze. Stating that he was dissatisfied with the answer received from the Bureau of Mines, because the material did not disclose a copy of a preliminary draft of the report, which he charged was submitted to the methanol manufacturers, previous to its public release, the Senator was unable to force through a resolution demanding a further investigation of his earlier charges.

Turner in Persulfates

Negotiations have been concluded which give to Joseph Turner & Co. the sole selling agency of two of Buffalo Electrochemical Co.'s products, potassium persulfate and ammonium persulfate. This arrangement will have no effect on Buffalo Electrochemical's present selling arrangements on peroxide. The negotiations between Turner & Co. and Buffalo Electrochemical have been under way for some time, but were finally successfully concluded a day or two after Mr. Turner's return from his annual Florida vacation, about the middle of March. The selling agreement between the two companies became effective on April 1.

This step marks the return of Turner & Co. to a field of distribution in which they were formerly very important factors. The introduction and growth in the number of uses for these two industrial chemicals was, in a great measure, due to the pioneering work done by that organization.

To obtain correct results in the applications of either of the persulfate salts it is necessary that they be of the highest purity. Special emphasis has been placed in the construction of the plant for their production on the maintenance of special quality and uniform physical characteristics.

Columbia Absorbs Winkler

Columbia Chemical Co. has announced that the alkali division of the Isaac Winkler & Brother Co. with offices at New York and Cincinnati, sole selling agent for the Columbia chemical division of the Pittsburgh Plate Glass Co. since the erection of the plant at Barberton, Ohio, in 1898 has been absorbed.

Eli Winkler, president of the Isaac Winkler & Brother Co., will continue as executive vice president in charge of sales. W. I. Galliher will become associated with the firm and will be director in charge of sales.

The company will maintain temporary quarters at 50 Broad street, but on or about April 20 the offices will be moved to the thirty-second floor of the Empire State Building.

Alsop 10th Anniversary

The Alsop Engineering Corp., New York, announce their tenth anniversary.

COMING EVENTS

American Institute of Chemical Engineers, Swampscott, June.

American Leather Chemists' Association, Atlantic City, May 27-29.

National Association of Purchasing Agents, Annual Convention, Toronto, Royal York Hotel, June 8-11.

American Society for Testing Materials, Chicago, June 22-26.

National Fertilizer Association, New Greenbriar, White Sulphur Springs, week of June 8.

Society of Chemical Industry, Montreal Section, Canadian Chemist's Convention, Montreal, May 27-29.

Electrochemical Society, Birmingham, Hotel Tutwiler, April 23-25.

Thirteenth Exposition of the Chemical Industries, Grand Central Palace, N. Y. City, May 4-10.

American Oil Chemists' Society, tentative, May 14-15, Roosevelt Hotel, New Orleans.

National Cottonseed Products Association, May 18-20, Roosevelt Hotel, New Orleans.

Insecticide and Disinfectant Manufacturers' Association, Edgewater Beach Hotel, Chicago, June 1-3.

During this time, they state that over 45,000 "Hy-Speed" Machines, Filters, and Glass-Lined Tanks have been sold. In 1921, they occupied two small rooms. Today their offices and services department alone occupy over 9,000 sq. feet; which includes the largest display room in New York for liquid handling equipment, all in addition to a large factory in the Bronx, N. Y. They have a new catalog showing plant installations which will be gladly sent to interested parties.

Federal Trade Commission has dismissed a complaint against the Colgate-Palmolive-Peet Co., of Chicago, charging unfair methods of competition through use in advertising of the word "naphtha."

New Resin Agreement

For several years the paint, varnish, lacquer and enamel industries have shown great interest in the phthalate and similar synthetic resins of the polybasic acid type, variously designated as Alkyd, Glyptal and Rezyls. Development of these resins and their uses has been retarded, however, because of the patent situation. Each of the three groups which have been responsible for a large part of the development of these resins and are actively engaged in research in this field, namely, General Electric Company, duPont Company, and American Cyanamid Company, have been faced with the possibility that resins and products from resins which they have developed and placed on the market might come under patent control of one of the other groups as a result of some patent obtained upon an application now pending in the U. S. Patent Office. There are a large number of these applications, besides a considerable number of issued patents controlled by the three groups. The patents and pending patent application cover both the resins and their uses, and are not limited to the field of coating compositions.

It is now announced that the restraint upon the development of these synthetic resins on account of patents has been removed by a series of agreements. The parties to these agreements are General Electric Company and its controlled companies, E. I. duPont de Nemours & Company and its controlled companies, American Cyanamid Company and its controlled companies (including the Rezyl Corporation) and the Ellis-Foster Company which, together with Rezyl Corporation controls the inventions of Carleton Ellis in this field. The purpose of these agreements is to make it possible for each group to pursue its technical and commercial development in this resin field with the assurance of immunity against prosecution of itself or its customers under the patents that are at present owned or may shortly be obtained by the other groups. Greatly increased activity in synthetic resins is expected to result.



Roof Timbers of Large Paper Mill Treated with Zinc Chloride to Prevent Premature Replacement, Resulting in Minimum Maintenance Cost. Timbers Painted White After Installing Same as if Untreated Timber Had Been Used.

Prevent ROT in Mill Timbers

CONDITIONS in textile mills, paper and pulp mills, refrigeration plants, and many other establishments are known to be conducive to the early rotting of wood. And wood decay is both troublesome and expensive.

Mill timbers treated with Zinc Chloride have from three to ten times greater life than untreated timbers thereby eliminating the need of costly replacements.

Zinc Chloride treated wood is fire retarding and termite resisting. It is clean, odorless and paintable.

Commercial wood preserving plants are available for treating wood under pressure—assuring the deepest possible penetration of every structural timber that goes into your mill. Write us for their names and addresses and more detailed information concerning wood preservation.

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Z GRASELLI ZINC CHLORIDE
A Positive Preventive of DECAY in Mill Timbers

Reports that the Barnsdall Corp. contemplated entering into the synthetic production of butyl alcohol were current in chemical circles.

Warner Chemical, United Chemical, and Westvaco Chlorine and their subsidiaries are now in their new offices on the 10th floor of the Chrysler Building, New York City. The telephone number remains unchanged.

Lactic Acid is now being manufactured by the Lactate Corporation, 7 Van Brunt Street, Brooklyn, N. Y. This acid, is made according to a process which has been developed by the company in its own plant. The company holds the patents for the process.

The Lactate Corporation has been incorporated under the laws of the State of New York, with Mr. B. R. Armour as its president.

Van Schaack Bros. Chemical Wks., Inc., have combined office and warehouse facilities at Pennsylvania and Jacobus Avenues, South Kearny, N. J.

The Koppers Company announces that the sale and distribution of all the products of its subsidiaries, the American Tar Products Company, the Koppers Products Company, and the Tar Products Corporation, will be consolidated and unified under the name of Koppers Products Co., effective March 1, 1931.

American Patents Development Corp. and Dry Ice Corp. of America lost their suit in Supreme Court against Carbice Corp. of America for infringement of a patent covering the manufacture of solidified carbon dioxide or "dry ice" as a refrigerant.

The Carbice Corp. sold its solid carbon dioxide to a user of the patent and suit was instituted by the development corporation for infringement of its patent.

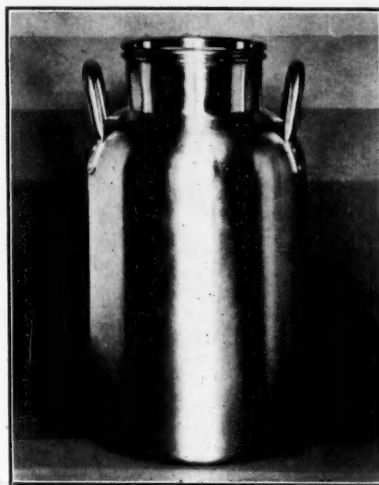
Completion of the expansion program involving the expenditure of approximately \$5,000,000 by the Solvay Process Co., a unit of Allied, in the Syracuse area has been set for April 1. Enlargement of the brine pipe lines from the wells in Tully, N. Y., to the Solvay Process plant in Solvay, N. Y., to a 20-inch main, double the size of the original main, has been completed and brine has been flowing through the new line since late in December. This work alone cost more than \$1,000,000.

One of the first industrial films to receive a general television broadcast will be the Hercules Powder Company's motion-picture "The Doings of Turp and Tine." The film will be broadcast from station W2XCD, Saturday evening, March 14.

Company News

Petroleum Chemical Corp., subsidiary of National Distillers Products Corp., has filed suit in U. S. District Court for District of New Jersey against Standard Oil Co. of New Jersey for infringement of patents covering the production of higher alcohols from liquefied petroleum gases.

Petroleum Chemical has been chiefly sponsored by National Distillers, Barnsdall Oil Co., Blair & Co., and A. D. Little, Inc., chemical engineers. It has been operated jointly by National Distillers and Barnsdall Oil Co., and has been marketing solvent alcohols to the general trade. Its plant is located at Barnsdall, Oklahoma.



The use of allegheny metal in chemical plants in the form of pipe, tanks and heat exchangers has been extended to containers for corrosive acids

Construction work on the Bound Brook plant of Bakelite Corporation is now rapidly nearing completion. The main building, which is of steel and brick construction, 400 feet square and 90 feet high, is about 95 per cent complete. The five other large buildings, also of brick and steel, which will be used for manufacturing purposes, and nine auxiliary buildings, including boiler plant, machine plant, and power house, are also practically finished.

The Flintkote Co. through its subsidiary, the Flintkote Roads, Inc., has been awarded contract by the state of New York for about 1,750,000 gallons of asphalt emulsion, covering 1931 requirements of the state for road purposes.

John S. Crowl has been appointed receiver of the Westmorehead Chemical & Color Co. of New Castle and Philadelphia.

The Holston River Power Co., a subsidiary of the American Cyanamid Co., has secured an option on 2,100 acres near here, which extends until September 20.

Much interest centers in the proposed \$25,000,000 electrochemical development planned.

Industrial Rayon Corp. is mailing to its customers and trade a letter denying alleged infringements of patents claimed by Tubize Chatillon Corp. in a recent suit in Wilmington, Del., and guaranteeing its customers against loss on claim of infringement.

For the purpose of making a test for either sulfur or oil, Texas Gulf Sulphur Co. has spudded in a well on a 60-acre tract of land at Moss Bluff near Liberty, Texas.

The Tubize Chatillon Corp. has filed suit in the United States District Court in Wilmington against the Industrial Rayon Corp. for infringement of the Singmaster patent No. 1,725,742, which was issued August 20, 1929, and the Gardner patent No. 1,692,372 issued November 20, 1928, both which were filed in 1927 and pertain to the use of fine pigment particles in the manufacture of its low-lustre yarn called Chardonize.

Equipment Companies

The newly elected officers of Duriron Co. are as follows: President, Wm. E. Hall, New York City; Vice-Presidents, Dudley H. Miller, St. Marys, Pa., John R. Pitman, New York City; Secretary Robert C. Schenck, Dayton; Treasurer, E. B. Thacker, Dayton. Mr. Dudley H. Miller was appointed General Manager. Mr. Wm. E. Hall succeeds Mr. P. D. Schenck, the late president and founder of the company.

Appointment of Lloyd C. Cooley as their mid-western representative with headquarters at 75 East Wacker Drive, Chicago, has been announced by the F. J. Stokes Machine Co., Philadelphia, manufacturers of chemical and pharmaceutical machinery and special process equipment.

Austin Co. has reduced costs on electric welding construction so that for the first time cost of this type of construction is said to be cheaper than the older riveted type.

A new method of lining steel tubing with a variety of metals or alloys to accomplish results heretofore not possible has just been announced by the Detroit Seamless Steel Tubes Company, which has secured exclusive patent rights to the process.

The Lukens Steel Co.'s plant at New Orleans has been purchased by the Jones & Laughlin Steel Corp., according to announcement by officials of the latter company.



Bichromate of Soda
Bichromate of Potash
Chromic Acid
Oxalic Acid



“Mutualize Your Chrome Department”

MUTUAL CHEMICAL CO. OF AMERICA
270 Madison Avenue
New York, N. Y.

New Construction

The Natural Products Refining Co., Jersey City, N. J. has announced the adoption of a building expansion program which will greatly increase the present production capacity of chrome products.

The American Hard Rubber Co. has announced plant expenditure approximately of \$150,000 for new construction at its Butler, N. J. works.

Outside construction work has started on the new cellulose acetate plant of the Tennessee Eastman Corp. at Kingsport, Tenn.

Personal

R. R. M. Carpenter has retired as a member of the executive committee of E. I. du Pont de Nemours & Co. He will remain as a director and a vice president.

A. W. Peet has been elected chairman of the board of the Colgate-Palmolive-Peet Co. Mr. Peet succeeds Sydney M. Colgate, deceased. C. L. Frederick, general domestic sales manager and Sydney Kirkman, president of Kirkman & Son, were elected directors.

Albert C. Lehman, president of Blaw Knox Co., sailed for Europe aboard the French liner France recently on a ten weeks business and pleasure trip.

Alexander Silverman was elected Vice-president of the American Ceramic Society at its meeting in Cleveland on February 25.

Bookshelf

Steel Construction, by Henry J. Burt and Herman Ritow, \$2.50, 434 pages, published by American Technical Society, Chicago.

An illustrated text and reference book on the design of steel framework for buildings.

Machine Shop Work, by Frederick W. Turner and Oscar E. Perrigo, \$2.50, 407 pages, published by American Technical Society, Chicago.

An illustrated treatise on approved shop methods, including the construction, uses and operation of tools and machines.

Machine Drawing, by Charles L. Griffin and Robert H. Fortman, \$2.00, 288 pages, published by American Technical Society, Chicago.

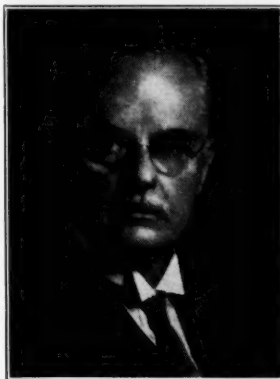
A new and comprehensive illustrated treatise on the subject.

Official Directory of the British Chemical Manufacturers' Association, 1931, published by the British Chemical Plant Manufacturers' Association, London.

A directory of the members and a list of their products and services, obtainable free from the publishers by users of chemical plant.

R & H Chairman Retires

A career of almost half a century in the chemical manufacturing industry was brought to a close with the recent retirement of Mr. William A. Hamann, as chairman and director of the Roessler & Hasslacher Chemical Co., Inc., New York, N.Y. Retirement was due to a desire to give up active business. The company operates plants at Niagara Falls, N. Y., Perth



William A. Hamann

Amboy, N. J. and El Monte, Calif., producing a variety of chemical specialties which are used in many industries.

It was in 1885 that Mr. Hamann joined Roessler and Hasslacher, as the present company was then known. This was four years before the firm changed its name to The Roessler and Hasslacher Chemical Co. His early years with the company were spent in the business department, as clerk, shipper and many other jobs, for the company was small. This varied experience stood Mr. Hamann in good stead for as the company grew, Mr. Hamann gradually assumed greater responsibilities. He was successively secretary, treasurer, vice-president, and in 1926, president of the company. In the early part of 1928, Mr. Hamann became chairman of the board.

Mr. Hamann's long service with the company was marked by the continuous and sturdy growth of the concern to one of the leading chemical manufacturers in the United States. He was instrumental in this development, helping to introduce and maintain company policies which did much to promote the company's prosperity, prestige and a solidarity within the organization itself.

Sulfur Tax

A further threat has been made in the Texas Legislature to raise the present sulfur tax from 55 cents per ton to \$1 a ton. The 55 cent sulfur levy was adopted last year after a prolonged debate as a last-minute compromise. E. M. Barron, chairman of the subcommittee, expressed the opinion at the close of last week that the higher sulfur tax would be adopted. He also predicted that natural gas would have to pay a severance tax.

Government Bulletins

3061. A study of the properties of Texas polyhalite pertaining to the extraction of potash. III. Calcination of polyhalite in a rotary kiln of laboratory size; by Loyal Clarke, J. M. Davidson, and H. H. Storch. 12 p. 2 illus.

Describes construction and operation of rotary kiln. Gives results of study of the variables and of factors affecting extraction procedure. Discusses results of calcination extraction experiments on 10 to 100 mesh Polish polyhalite and on such polyhalite of other degrees of fineness.

3062. A study of the properties of Texas polyhalite pertaining to the extraction of potash. IV. Experiments on the production of potassium chloride, by the evaporation of leach liquors from decomposition of unclaimed polyhalite by boiling saturated sodium chloride solutions; by H. H. Storch and F. Frass. 7 p.

Reports that evaporation of 90 per cent of the water of the leach liquors interspersed with three crystallization steps will yield 78 per cent of the potash as crude KCl which may be readily refined to produce pure KCl. The preliminary production cost estimate is about \$20 per ton. The possibility of industrially workable deposits of sylvanite in Texas and New Mexico is mentioned.

3087. Consumption of explosives in December, 1930; by W. W. Adams and L. S. Gerry. 10 p.

A monthly report of manufacture and sales of explosives.

6429. Method and cost of recovering quicksilver from low-grade ore at the reduction plant of the Sulphur Bank Syndicate, Clearlake, Calif.; by Worthen Bradley. 17 p. 6 illus.

An issue in a series of papers dealing with metallurgical practice and costs. Describes the ore treated and the present method of reduction. Gives detailed cost data.

6439. Effect on workers of air conditions; by R. R. Sayers. 31 p.

Summarizes recent literature on exposure to dusts, on exposure to toxic or noxious gases, and on abnormal temperatures and humidities.

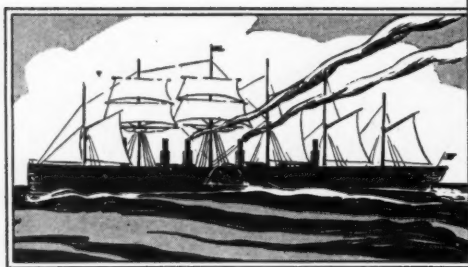
Single copies of the above publications may be obtained without cost from the Section of Publications, U. S. Bureau of Mines, Washington, D. C.

S. O. of N. J. Insurance

An industrial insurance and pension plan for the 45,000 employes of the Standard Oil Company of New York, to be administered by the Metropolitan Life Insurance Company under terms which make it the largest transaction of its kind ever undertaken by a private corporation, was announced recently by Herbert L. Pratt, chairman of the board of the oil company.

Alcohol Regulations

Announcement comes from Washington that the long awaited alcohol regulations are to be placed in effect on April 1. Several tentative dates have been set for their promulgation but each time the date has been moved forward for one reason or another.



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The Financial Markets

"Cosach" Financing Announced—Stocks Lose February Gains—Vanadium Proposes New Financing—Penn. Salt Dividend Lowered.

The long awaited announcement on the financing of the new Nitrate Co. of Chile (Cosach) was made public near the close of the month. Negotiations have been going on in New York for several months between the representatives of the Chilean government, the new company, the Guggenheim interests and several banking syndicates.

"Cosach" Bonds Sold

The entire issue has been underwritten. A part of the issue, aggregating £3,000,000 sterling, will be offered in London and on the Continent on Monday.

A banking syndicate composed of J. Henry Schroeder & Co.; Baring Bros. Co., Ltd.; N. M. Rothschild and Morgan, Grenfell & Co. has been formed to dispose of £2,000,000 of the bonds in London. In Holland £500,000 of the bonds will be sold through Mendelssohn & Nederlandsche, Handelsmaatschappij, and in Switzerland, the Credit Suisse will sell £400,000. Another £100,000 has been allocated to Sweden. An issue of \$19,000,000 of the bonds has been subscribed privately by the National City Co., the Guggenheim interests and the Anglo-South American Bank. The announcement by Senor Ramirez stated that the date of public issue by this banking group in New York is as yet indefinite.

Proceeds of the bond sale, to approximate \$30,000,000 will be divided into \$22,000,000 for the Chilean Government and \$8,000,000 for the Cosach company, to be used as current working capital. There are authorized \$50,000,000 of the bonds, but no indication has been given as to the disposition of the \$16,000,000 not now sold.

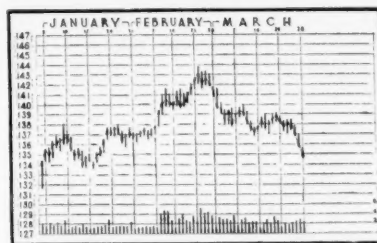
The final stipulation governing the payments follows closely on the preliminary arrangements made last summer.

Stock Prices Sag

The first week of the past month witnessed the stock market in a very tired state after its remarkable rally in February. Under the influence of the unfavorable action of the directors of the New York Central in reducing the dividend, prices were lower and trading more restricted. The copper stocks were somewhat bullish due to the temporary strengthening in the metal price. In the second week the unsettlement

*N. Y. Herald-Tribune

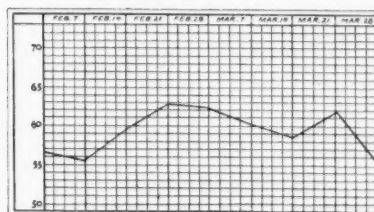
continued, despite a slight rally in parts of the list. A better tone pervaded the Street during the third week. With



some exceptions prices were higher. This upward trend in the market was of short duration, however, and in the closing week values again crumbled in the face of unsatisfactory dividend news from market leaders in the railroad and copper stocks. As the month ended, practically all of the gains of the previous month were wiped out, and a very definite sentiment of pessimism was in evidence in the pronouncements issuing from the commission houses.

Chemical Co. Stocks

The CHEMICAL MARKETS average common stock price showed a decline of 6.7 points on March 28 from the figure for February 28, a drop of 11 per cent for



the month. The increase in February over January amounted to 10+ per cent so that the gain in February in chemical common stock prices was entirely lost during the past month. The average

figures for the four Fridays of the month were as follows: March 7, 60.2; March 14, 58.8; March 21, 61.5; March 28, 55.6.

Alcohol Price War

The industrial chemical common stocks were of course carried along in the downward swing in the absence of definitely optimistic news to counteract the general adverse movement. Allied Chemical closed at the following prices for the four Fridays of the month: March 7, 155; March 14, 152¼; March 21, 159½; March 28, 152¾. The price on March 28 represented a drop of 18¼ points from the closing figure for February. A glance at the accompanying list clearly indicates the severity of the drop in values. In the face of the sharp cut in the price of alcohol, combined with an unfavorable earnings report for 1930, United States Industrial Alcohol was off 22¾ points, from 71½ to 49¾, and the other alcohol producers on the Big Board were in a similar position as the month closed. Alcohol stock values were again feeling the new public investment interest in the stocks of chemical companies.

Oils Lower

The oil stocks were generally weaker due to the unfavorable condition of the industry generally and the unwieldy surplus of crude oil that continues to plague any constructive action. Standard of New Jersey held up remarkably well under these conditions, and while it did show a loss from the closing February price, it was but fractionally off on March 28, when comparison was made with the closing price for the first week of the month.

Unsettlement In Copper

The copper stocks again reflected the unsettlement in the price of the metal. It seems quite impossible for producers to maintain the price above the 10c level for any extended period of time and on the last week Anaconda, Kennecott and American Smelting & Refining reacted with the general list.

Price Trend of Chemical Company Stocks

Name	February 28	March 7	March 14	March 21	March 28	Net Change
Allied Chemical.....	171	155	155	159½	152¾	-18½
Air Reduction.....	101¾	98¾	98¾	102¼	94¼	-6¾
Anaconda.....	41½	39½	37¾	39¼	33½	-7¾
Columbian Carbon.....	106	93¾	95¾	100¾	81½	-24½
Commercial Solvents.....	19¾	19½	19	20¼	18½	-1¾
Du Pont.....	99¼	96¾	96½	106¾	98½	-5¾
Standard, N. J.....	50½	46½	45¾	46¾	44	-6¾
Texas Gulf.....	54¾	51½	52¾	52	50½	-4¾
U. S. I.....	71½	68¾	67½	63¾	48¾	-23

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CARLSBAD, NEW MEXICO

Ashcraft-Wilkinson Co.

Charleston, S. C.

Atlanta, Ga.

Norfolk, Va.

Financial News

Vanadium Corp. of America is planning to issue \$5,000,000 10-year 5% sinking fund debentures. The bonds will be convertible at any time into capital stock at a price understood to be \$80 a share.

The proceeds of the issue will reimburse the corporation for expenditures on properties of Southern Mineral Products Corp., a subsidiary developing a mineral body in Virginia. About \$3,000,000 has been spent on the development and the new plant is about ready for operation. The proceeds of the issue also will provide additional working capital for further extensions and improvements contemplated.

Vanadium has no other funded debt and only one class of stock.

St. Joe's Debentures

Stockholders of St. Joseph Lead Co. will be asked to approve at the annual meeting April 9 a proposal to issue \$10,000,000 convertible debentures. These bonds would be offered to stockholders in the ratio of \$100 debentures for each twenty shares of stock owned. Financing for St. Joseph Lead would be for the purpose of partially reimbursing the company for capital expenditures which in the last four years have amounted to \$21,607,427 in mine developments.

The company at present has no bonded indebtedness and approval of the stockholders is necessary for the issuance of any bonds.

The annual stockholders meeting of United Chemical, Inc., was held on March 24, and the stockholders meeting of Westvaco Chlorine on the following day. The directors of Westvaco, C. B. Ewart, V. A. Johnston, W. B. Thom, W. P. Patten and M. E. Gilbert were reelected as were the officers, W. B. Thom, President, W. D. Patten, A. M. Pitcher, Vice-Presidents, and M. E. Gilbert, Secretary and Treasurer.

Public in Chemical Stocks

The increase in public ownership of common stocks of chemical companies showed the greatest increase in 1930 over 1929 when comparison is had with other industries, according to a comparison made by Hyman & Co., of the N. Y. Stock Exchange.

STOCKHOLDERS BY GROUPS

Companies	*	Total Stockholders			Per Cent	Increase
		1928	1929	1930		
Miscell.	(20)	411,265	524,712	593,519	27.5	13.1
Public Utilities	(18)	621,462	1,007,401	1,281,155	62.1	27.2
Railroads	(15)	604,908	808,670	844,115	33.7	4.3
Foods	(9)	206,557	255,810	300,720	15.3	15.0
Oils	(9)	548,644	878,330	1,002,189	60.0	14.1
Automobile	(7)	144,725	343,498	425,871	143.2	22.9
Banks and Finance	(6)	159,909	328,341	382,254	105.0	16.5
Telegrams and Tel.	(6)	538,899	628,467	731,757	16.7	16.4
Metals	(4)	188,942	224,103	245,619	15.6	9.6
Chemicals	(3)	46,707	83,718	99,809	79.2	19.2
Chain Stores	(3)	46,508	118,849	138,506	156.0	16.9

*Number of companies reporting.

Dividends and Dates

Company	Stock on record	Dividend	Payable
Abbott Lab.	March 18	.62½	April 1
Air Reduction	March 31	\$.75	April 15
Allied Chem pf.	March 7	1.75	April 1
Celanese pf.	March 14	1.75	April 1
Colgate-Palm.	March 20	.62½	April 15
du Pont, deb.	April 10	1.50	April 25
Eastman K.	March 5	1.25	April 1
Eastman K ext.	March 5	.75	April 1
Eastman K pf.	March 5	1.50	April 1
Freeport Texas	May 15	.75	June 1
Gen P ink	March 17	.62½	April 1
Gen P ink pf.	March 17	1.50	April 1
Int. Nickel Can pf.	April 1	1.75	May 1
Int. Salt	March 16	.75	April 1
Math. Alk.	March 13	.50	April 1
Math. Alk pf.	March 13	1.75	April 1
Monsanto	March 10	.31½	April 1
Natl. Lead pf B	April 17	1.50	May 1
Nichols Cop A & B	March 10	.25	April 1
Proctor & G 8%	March 15	2.200	April 15
Union Carbide	March 4	.65	April 1

Equipment

Foster W.	March 12	.50	April 1
Foster W pf.	March 12	1.75	April 1
Gen Am Tank	March 13	1.00	April 1
Books			Privilege
Close			Expires

Rights

Alum Ltd.	December 15	July 2
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Annual and Special Meetings

Amer. Solvents & Chem.	April 15
Union Carbide & Carbon	April 21
McKesson & Robbins	April 14
National Dist. Prod.	April 15
Stand Oil Co.	May 7

Pennsylvania Salt Manufacturing Co. declared a quarterly dividend of 75 cents, placing the stock on a \$3 annual basis, against \$5 previously. Dividend is payable April 15 to stock of record March 31.

Cleveland Cliffs Iron Co. declared a quarterly dividend of 25 cents, payable March 20 to stock of record March 10, and the regular quarterly dividend of \$1.25 on the 5% preferred, payable March 16 to stock of record March 5. Common dividend places the stock on a \$1 annual basis against \$4 previously.

Hercules Powder Co. has declared the regular quarterly dividend of \$1.75 on the preferred stock, payable May 15 to stock of record May 4.

Retiring directors and officers were reelected.

The Anaconda Copper Mining Co. has lowered its annual rate from \$2.50 to \$1.50 by ordering a quarterly disbursement of 37½ cents.

*New Highs and Lows

High

Am. Agr. C.	Hercules Pow
Am. Smelt. Ref. pf	Int. Nickel pf
Am. Zn pf	Int. Print Ink
Certainated pf	Johns Manville
Colgate-Palm	Monsanto
Corn Prod pf	National Lead pf A
Du Pont 6%	Newport A
Eastman K pf	Spencer Kellogg
Freeport Texas	U. S. Gypsum
Gen. Printing Ink	Westvaco Chl

Lows

Allied C	Stand. N. J.
Atlas Powder	Tenn. Corp.
Olivers Filters pf	Texas Corp.
Pure Oil pf	U. S. Ind Al
St. Josephs Ld	
Stand Cal	

*Up to and including March 27.

Westinghouse Electric & Manufacturing Co. has reduced its dividend rate from \$5 to \$4 on the common stock.

Anaconda Copper Mining Co. has declared a quarterly dividend of 37½ cents, payable May 18 to stock of record April 11. This places the stock on a \$1.50 annual basis, against \$2.50 previously.

Link-Belt Co. has declared the regular quarterly dividends of 60 cents on the common stock, payable June 1 to stock of record May 15 and \$1.62½ on the preferred stock, payable April 1 to stock of record March 24.

Retiring directors and officers were reelected.

Listings

International Match Corp., \$500,000 additional ten-year 5% convertible gold debentures, due January 15, 1941.

Virginia-Carolina Chemical Corp., 144,871 shares of 7% cumulative dividend prior preference stock (\$100 par value).

At the annual meeting of Vulcan Detinning Co., May 7th next, stockholders will be asked to vote for a reduction in the company's capital stock by the retirement of the 4,485 shares of the preferred stock now held in the treasury.

At the annual meeting of the stockholders of the Monsanto Chemical Works, held Tuesday morning, March 24, the following directors were re-elected to serve during the ensuing year: John F. Queeny, Edgar M. Queeny, Gaston DuBois, Theodore Rassieur, Joseph D. Lumaghi, James Becker, Howell W. Murray, Charles Belknap, Philip Stockton, J. W. Livingston and H. O. McDonough.

Over the Counter Prices

Company	Bid	Asked
Am. Hard Rubber	32	...
Baker, J. T. Chem.	10	14
Dixon Crucible	130	145
Dry Ice	32	38
Merek, pfd.	74	78
Solid Carbonic	8½	10
Tubize Chat. pf.	34	40
Worcester Salt	87	92

Closing prices, Saturday, March 28.

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General Motors Bldg.
Detroit, Mich.

Chemical Solvents, Inc., 110 E. 42nd Street
New York

205 East 42nd Street
New York

3520 W. 140th Street
Cleveland, O.

Company Reports

Allied Net \$5,000,000 Less

Allied Chemical & Dye Corp. and subsidiaries for year ended December 31, 1930, shows net income of \$25,103,539 after depreciation, federal taxes, etc., equivalent after 7% preferred dividends, to \$9.77 a share on 2,286,980 no-par shares of common stock. This compares with \$30,198,523 or \$12.60 a share on 2,178,109 shares in 1929.

Surplus after dividends in 1930 was \$8,472,070 against \$14,379,926 in previous year.

Current assets on December 31, last, amounted to \$155,451,336 including cash, government and marketable securities of \$113,320,484 and current liabilities were \$8,715,055 leaving net working capital of \$146,736,281 compared with current assets of \$157,776,046, current liabilities \$9,520,724 and net working capital of \$148,255,322 at close of previous year.

Consolidated income account for year 1930 compares as follows:

	1930	1929	1928	1927
*Gross inc....	\$27,886,685	\$33,384,552	\$29,871,001	\$27,714,736
Fed tax.....	2,783,146	3,186,029	2,908,561	3,127,864
Net inc....	\$25,103,539	\$30,198,523	\$26,962,441	\$24,586,872
Pfd divs....	2,749,943	2,749,943	2,749,943	2,749,943
Com divs....	13,881,526	13,068,654	13,068,654	13,068,654
Surplus....	\$8,472,070	\$14,379,926	\$11,143,844	\$8,768,275
P & L surp....	204,133,460	196,205,745	181,825,818	170,681,974

*After expenses, depreciation, ordinary taxes, etc.

Nickel Earnings Halved

International Nickel Co. of Canada, Ltd., and subsidiaries, for year ended December 31, 1930, shows net profit of \$11,770,060 after interest, federal taxes, depreciation, depletion, etc., equivalent, after 7% preferred dividends, to 67 cents a share on 14,584,025 no-par shares of common stock outstanding at end of year. This compares with \$22,235,996 or \$1.47 a share on 13,758,208 common shares at end of 1929.

Net profit for quarter ended December 31, 1930, was \$1,872,225 after above charges, equal to 9 cents a share on 14,584,025 no-par shares of common stock, comparing with \$2,013,961 or 10 cents a share on 14,584,025 common shares in preceding quarter and \$5,370,243 or 36 cents a share on 13,758,208 common shares in December quarter of 1929.

Consolidated income account for year 1930 compares as follows:

	1930	1929	1928
*Earnings.....	\$18,389,983	\$29,353,073	\$16,076,595
Other income.....	616,858	1,800,587	629,999
Gross inc.....	\$19,006,841	\$31,153,660	\$16,706,594
Expenses.....	1,552,027	1,846,316	967,478
Federal taxes.....	1,229,657	2,682,395	1,188,679
Interest.....	481,158	448,066	
Depr, depl, etc.....	3,973,939	3,940,887	2,151,120
Net profit.....	\$11,770,060	\$22,235,996	\$12,399,317
Pfd dividends.....	1,933,920	2,040,501	557,034
Common dividends.....	14,148,941	12,375,704	4,331,096
Deficit.....	\$4,312,801	\$7,819,791	\$7,511,187
P & L surplus.....	\$80,778,815	73,387,700	33,169,819

United Chemical Net Profit Drops

United Chemicals Inc., and subsidiaries show sales of \$6,356,153 and net profits of \$815,122 in 1930. After deducting profits applicable to minority interest, portion applicable to United Chemicals preferred amounted to \$476,150. Balance for 102,000 common shares was \$130,700. The consolidated balance sheet shows current assets of \$3,284,724, against current liabilities of \$111,899.

During the year the company acquired control of Industrial Chemical Corporation, Ltd., which in turn owns California Chemical Corporation, Sierra Magnesite Co., National Kellastone Co. and National Reduction Co., engaged in the production and sale of bromides and various calcium and magnesium products.

Newport Reports Lower Profit

Newport Company and its subsidiary companies report a net profit of \$863,404 for the year ended December 31, 1930, after depreciation, interest, Federal taxes and other charges. This was equal to \$1.47 a share on the common shares outstanding after dividends on the convertible class A shares. It compared with \$1,682,285, or \$3.50 a common share in 1929. The surplus account showed a surplus of \$7,241,518 as of December 31, 1930, compared with \$6,848,671 on the same day in 1929.

The consolidated income account for 1930 compared with 1929 as follows:

	1930	1929
Net sales.....	\$9,302,938	\$11,084,646
Costs and expenses.....	7,718,488	8,659,708
Operating profit.....	\$1,584,450	\$2,424,938
Other income.....	40,816	33,389
Total income.....	\$1,625,266	\$2,458,327
Depreciation.....	634,932	557,750
Interest.....	19,705	22,292
Federal taxes.....	105,225	196,000
Net profit.....	\$865,404	\$1,682,285
Class A dividends.....	102,560	264,971
Common dividends.....	997,689	393,573
Deficit.....	\$234,845	*\$1,023,741
*Surplus.....		

Merck Earns \$8 a Share

Merck Corp. for year ended December 31, 1930, shows net profit of \$271,585 after expenses and taxes, equivalent to \$8 a share (par \$100) on 33,950 issued shares of 8% preferred stock on which unpaid cumulative dividends amounted to 34% at end of year. This compares with \$428,080 or \$12.61 a share on preferred stock in 1929. Net profit of Merck & Co., Inc., and subsidiaries, controlled by Merck Corp. for year ended December 31, 1930, was \$426,206 after depreciation, interest, amortization and federal taxes, equal to \$4.26 a share on 100,000 shares of no-par stock. This compares with \$696,782 or \$6.97 a share in 1929.

Pittsburgh Plate Glass Co. for year ended December 31, 1930, shows net profit of \$4,743,538 after depreciation, depletion, federal taxes, etc., equivalent to \$2.19 a share (par \$25) on 2,166,524 shares of stock. This compares with \$11,685,311 or \$5.39 a share in 1929.

Income account for year 1930 compares as follows:

	1930	1929	1928	1927
Net earn.....	\$9,121,841	*\$17,148,132	\$13,988,000	\$11,667,755
Depr, depl, etc.....	3,928,303	4,112,821	4,311,634	4,362,400
Fed taxes.....	450,000	1,350,000	1,207,593	875,000
Net profit.....	\$4,743,538	\$11,685,311	\$8,468,773	\$6,430,355
Cash divs.....	4,322,916	6,491,874	4,037,301	6,395,596
Surplus.....	\$420,622	\$5,193,437	\$4,431,472	\$34,759

*Includes unused tax reserve of \$40,478.

American Smelting & Refining Co. reports for year ended December 31, 1930, showing consolidated net income of \$11,098,751 after interest, depreciation, depletion and federal taxes, equivalent, after deducting preferred dividends, to \$3.77 a share on 1,829,940 no-par shares of common stock which will be outstanding when all old stock has been exchanged for new stock. This compares with \$21,831,583 or \$10.02 a common share, on above number of shares, in 1929.

Penick & Ford, Ltd., Inc., and subsidiaries, for year ended December 31, 1930, shows net profit of \$1,811,348 after depreciation, federal taxes, etc., equivalent after dividend requirements on 7% preferred stock, retired during the year, to \$4.01 a share on 424,965 shares of no-par common stock. In 1929 company reported net profit of \$1,882,441 after interest, depreciation, federal taxes, and after deducting \$290,569 writeoff of properties, equal to \$3.97 a share on the common stock.

National Lead Co. for year ended December 31, 1930, shows net profit of \$4,675,098 after taxes and reserves, equivalent after preferred dividends to \$7.58 a share on 309,831 shares of common stock.

International Salt Nets \$3.23

International Salt Co. and subsidiaries report, for year ended December 31, 1930, net income of \$679,480, after taxes, interest, depreciation and depletion, equivalent to \$3.23 a share on average number of shares outstanding during the year, and \$2.83 a share on 240,000 shares at end of year. In the preceding year, company reported net income of \$687,767, or \$11.32 a share (par \$100) on 60,771 shares of stock then outstanding.

Consolidated income account of International Salt Co. and subsidiaries for year 1930, compares as follows:

	1930	1929	1928	1927
*Total inc.....	\$1,041,135	\$980,382	\$731,450	\$639,508
Exp. tax etc.....	98,665	23,735	17,169	32,117
Bond int. etc.....	262,950	268,838	274,662	280,262
Balance.....	\$679,520	\$687,809	\$439,619	\$327,129
App to min int....	40	42	24	109
Net inc.....	\$679,480	\$687,767	\$439,595	\$327,020
Divs (old stk).....	211,157	273,470	91,156	364,627
Divs (new stk)....	360,000	.....	.....	.....
Surplus.....	\$108,323	\$414,297	\$348,439	†\$37,607

*After depreciation, depletion and taxes. †Deficit.

Eagle-Picher Lead Co. and subsidiary, Eagle-Picher Mining & Smelting Co., report for year ended December 31, 1930, net loss of \$1,919,465 after inventory loss, reserve for further losses and additional reserve for doubtful accounts. This compares with net profit in 1929 of \$1,215,812 after charges, depreciation and federal taxes, equivalent after dividend requirements on 8,390 shares of 6% preferred stock to \$1.16 (par \$20) on 1,000,000 shares of common stock.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF

AUGUST 24, 1912.

Of Chemical Markets, published monthly at Pittsfield, Mass., April 1, 1931.
State of New York, County of New York—ss.

Before me, a Commissioner of Deeds in and for the State and county aforesaid, personally appeared Williams Haynes, who, having been duly sworn according to law, deposes and says that he is the Publisher of the Chemical Markets, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Williams Haynes, 25 Spruce St., New York, N. Y.; Editor, none; Managing Editor, W. J. Murphy, 25 Spruce St., New York, N. Y.; Business Manager, William F. George, 25 Spruce St., New York, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Chemical Markets, Inc.; 25 Spruce St., New York, N. Y.; Williams Haynes, 25 Spruce St., New York, N. Y.; William F. George, 25 Spruce St., New York, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

Williams Haynes, Publisher.

Sworn to and subscribed before me this 31st day of March, 1931. Margaret A. Burt (Commissioner of Deeds, N. Y. Co. Clerk's No. 70 N. Y. Reg. No. 32B2. Commission expires March 3, 1932.)

(Seal.)

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Carbide 1930 Net \$28,041,425

Union Carbide & Carbon Corp. and subsidiaries for year ended December 31, 1930, shows net income of \$28,041,425 after federal taxes, depreciation, depletion, interest and subsidiary preferred dividends, equivalent to \$3.12 a share on 9,000,743 no-par shares of stock outstanding at end of year. This compares with net income in 1929 of \$35,427,024 or \$4.19 a share on 8,453,723 average shares during the year and \$3.94 a share on 8,981,581 shares at end of year.

Consolidated income account for year 1930, compares as follows:

	1930	1929	1928	1927
Net af fed tx.	\$37,002,705	\$44,126,066	\$39,527,253	\$34,195,682
Depr deplete	7,812,932	7,461,240	7,694,857	7,655,190
Balance....	\$29,189,773	\$36,664,826	\$31,832,396	\$26,540,492
Interest.....	611,670	674,802	692,014	706,832
Sub pf divs...	536,678	563,000	653,000	493,000
Net inc....	\$28,041,425	\$35,427,024	\$30,577,382	\$25,340,660
Dividends....	23,395,734	20,736,657	16,235,208	15,958,398
Surplus....	\$4,645,691	\$14,690,367	\$14,342,174	\$9,382,262
P & L surp....	*98,579,703	96,781,281	86,606,035	72,557,917

*After deduction of net adjustments amounting to \$2,847,269.

Monroe Chemical Co. for year ended December 31, 1930, reports net profit of \$240,465 after depreciation, interest and federal taxes equivalent after allowing for dividend requirements on 29,250 shares of \$3.50 preference stock, to \$1.09 a share on 126,000 no-par shares of common stock. This compares with net profit in 1929, (including earnings of Mary T. Goldman Co. from August 1) of \$400,489 or \$2.54 a share on 116,173 shares of common stock then outstanding.

Vulcan Detinning Co. reports for year ended December 31, 1930, net profit of \$335,734 after charges, depreciation and reserve for taxes, equivalent after dividend requirements on 19,709 shares of 7% preferred stock outstanding at close of the year to \$6.13 a share on 32,258 shares of common stock. This compares with \$618,696 or \$14.05 a share on combined 20,000 shares of common and 12,258 shares of Class A common shares in 1929.

United States Gypsum Co. reports for year ended December 31, 1930, net income of \$5,408,685 after depreciation, depletion, federal taxes, etc., equivalent after 7% preferred dividends, to \$4.01 a share (par \$20) on 1,212,598 shares of common stock outstanding at end of year. This compares with \$5,102,305, or \$3.98 a share on 1,149,290 shares outstanding at end of 1929.

Colgate-Palmolive-Peet Co. and subsidiaries, including operations of Kirkman & Son, Inc., acquired during the year, for year ended December 31, 1930, shows net profit of \$8,550,055 after depreciation, interest and federal taxes. This is equivalent, after 6% preferred dividend requirements, including allowance for full year's dividends on preferred stock issued for Kirkman & Son, Inc., on October 1, 1930, to \$3.76 a share on 1,999,970 no-par shares of common stock and compares with \$8,910,631 or \$4.03 a common share in 1929.

St. Joseph Lead Co. and subsidiaries for year ended December 31, 1930, shows profit of \$4,076,460 after depreciation, federal taxes and minority interest, but before depletion, equivalent to \$2.09 a share (par \$10) on 1,950,462 shares of stock comparing with profit of \$9,730,742 or \$4.99 a share before depletion in 1929. Net profit after depletion for 1930, amounted to \$1,509,991 equal to 77 cents a share against \$7,466,002 or \$3.83 a share in previous year.

Industrial Rayon Corp. for year ended December 31, 1930, shows net profit of \$1,547,529 after depreciation, interest and federal taxes, equivalent to \$7.74 a share on 200,000 shares of stock. This compares with \$1,451,729 or \$7.63 a share on 190,068 shares in 1929.

Vanadium Earnings Slump

Vanadium Corp. of America and subsidiaries for year ended December 31, 1930, shows net income of \$1,116,983 after federal taxes, depreciation, depletion, etc., equivalent to \$3.04 a share on 366,637 no-par shares of capital stock, excluding 11,730 shares owned by the corporation. This compares with \$1,849,886 or \$5.26 a share on 351,637 shares in 1929, excluding stock in treasury. Based on 378,367 issued shares of stock including treasury shares outstanding at end of year, 1930 net income is equal to \$2.95 a share, comparing with \$4.89 a share on the same number of shares in previous year.

Consolidated income account for year 1930 compares as follows:

	1930	1929	1928	1927
*Net earn.....	\$981,287	\$2,328,830	\$1,976,165	\$2,221,374
Other inc.....	†697,091	344,561	216,794	243,884
Total inc.....	\$1,678,378	\$2,673,391	\$2,192,959	\$2,465,258
Depr & depl.....	512,202	608,448	251,305	358,211
Fed tax.....	49,193	207,630	228,704	228,530
Other chgs.....	.....	7,427	6,926	29,277
Net inc.....	\$1,116,983	\$1,849,886	\$1,706,024	\$1,849,240
Dividends.....	1,088,586	1,468,648	1,506,548	1,506,548
Surplus.....	\$28,397	\$381,238	\$199,476	\$342,692

*After expenses, ordinary repairs and maintenance. †Includes profit on resale of company's own stock.

Equipment Companies

Foster-Wheeler Corp., reports for year ended December 31, 1930, net income of \$1,651,276 after taxes and depreciation, equivalent, after 7 per cent preferred dividends, to \$6.34 a share on 239,015 no-par shares of common stock. This compares with \$1,614,970, or \$6.05 a share, on 231,055 common shares in 1929.

Westinghouse Sales \$180,283,579

Westinghouse Electric & Manufacturing Co. shows net income available for dividends equivalent to \$4.45 a share on outstanding common and preferred stock, which compares with \$10.15 a share earned in 1929. Gross sales of the company last year totaled \$180,283,579, as compared to \$216,364,588 for 1929, while net manufacturing profits amounted to \$8,312,461, against \$21,992,601 in 1929. Net income available for dividends in 1930 is shown to have been \$11,281,705, as compared to \$27,062,611 the previous year.

Dividend requirements of the company last year were met partly out of surplus with the result that this item on the balance sheet was \$1,445,023 lower at the close of 1930 than it was at the close of 1929.

American Solvents & Chemical Corp. reports the year ended December 31, 1930, net loss of \$870,053 after depreciation, interest and adjustment of inventories to market value.

Earnings at a Glance

Company	Annual Dividend	Net Income 1930	Net Income 1929	Common Share Earnings 1930	Common Share Earnings 1929
Certain-Teed Prod..	f	†2,468,319	†1,288,586	.....	.....
Columbian Carbon Co.....	5.00	2,514,923	3,665,491	h5.04	h7.83
Heyden Chem. Corp.	2.00	302,402	483,519	1.87	3.08
Johns-Manville Corp.....	3.00	3,268,123	6,591,916	3.66	8.09
Newport Co.....	1.00	863,404	1,682,285	h1.47	h3.50
Union Carbide and Carbon Corp.....	2.60	28,041,425	35,427,024	3.12	3.94
Texas Corp.....	3.00	15,073,303	48,318,072	h1.53	j5.12
U. S. Industrial Alcohol.....	6.00	†1,895,247	4,720,858	.....	12.63
U. S. Smelt., Ref. & Mining.....	1.00	3,699,655	4,818,866	h3.45	h5.31

Equipment Companies

American-La France & Foamite Corp..	f	†\$385,945	\$259,064	.....	.....
Foster Wheeler Corp	2.00	1,651,276	1,614,970	6.34	6.05
†No dividend.					
hApproximated.					
†Loss.					

The Industry's Stocks

1931 Mar.						Sales In Mar.		During 1931		ISSUES		Par \$		Shares Listed		An. Rate		Earnings \$-per share-\$	
High	Low	Last	High	Low	High	Low												1930	1929
NEW YORK STOCK EXCHANGE																			
104 1/2	92 1/2	92 1/2	109 1/2	92 1/2	156 1/2	87 1/2	131,100	450,200	Air Reduction.....	No								6.32	7.75
172 1/2	141 1/2	142 1/2	182 1/2	141 1/2	343 1/2	170 1/2	292,700	739,700	Allied Chem. & Dye.....	No									12.60
124 1/2	122 1/2	123 1/2	124 1/2	120 1/2	126 1/2	120 1/2	4,600	9,500	7% cum. pfd.....	100									76.88
26 1/2	22 1/2	22 1/2	29 1/2	20 1/2	10 1/2	1 1/2	4,400	20,700	Amer. Agric. Chem.....	100							Yr. Je. '30	Nil	
12 1/2	8 1/2	8 1/2	14 1/2	8 1/2	33 1/2	9 1/2	21,800	87,300	Amer. Com. Alc.....	No									3.22
22 1/2	18 1/2	20 1/2	22 1/2	16 1/2	51 1/2	7 1/2	19,300	42,400	Amer. Metal Co., Ltd.....	No									3.23
56 1/2	44 1/2	46 1/2	58 1/2	40 1/2	79 1/2	37 1/2	120,200	332,045	conv. 6% cum. pfd.....	100									47.53
138 1/2	136 1/2	138 1/2	138 1/2	129 1/2	141 1/2	131 1/2	3,200	6,200	Amer. Smelt. & Refin.....	No									10.02
4 1/2	2 1/2	2 1/2	4 1/2	2 1/2	22 1/2	2 1/2	8,300	19,600	7% cum. pfd.....	100									43.66
7 1/2	6 1/2	6 1/2	8 1/2	4 1/2	17 1/2	3 1/2	7,700	48,100	Amer. Solvents & Chem.....	No									2.56
40 1/2	35 1/2	38 1/2	39 1/2	26 1/2	79 1/2	26 1/2	800	4,600	Amer. Zinc Lead & Smelt.....	25									0.53
42 1/2	32 1/2	33 1/2	43 1/2	29 1/2	81 1/2	25 1/2	558,200	1,626,525	6% cum. pfd.....	25									7.32
17 1/2	14 1/2	14 1/2	17 1/2	14 1/2	29 1/2	13 1/2	11,500	37,700	Anaconda Copper Mining.....	50							Yr. Aug. '30	1.68	8.29
22 1/2	18 1/2	18 1/2	23 1/2	18 1/2	51 1/2	16 1/2	75,000	302,400	Archer Dan. Midland.....	No									
52 1/2	42 1/2	54 1/2	42 1/2	106 1/2	42 1/2	42 1/2	3,700	12,700	Atlantic Refining Co.....	25								1.02	6.20
98 1/2	97 1/2	97 1/2	99 1/2	97 1/2	106 1/2	97 1/2	100	810	Atlas Powder Co.....	No								2.67	7.66
2 1/2	1 1/2	1 1/2	2 1/2	1 1/2	5 1/2	1 1/2	4,100	10,500	6% cum. pfd.....	100									28.25
2 1/2	1 1/2	1 1/2	2 1/2	1 1/2	4 1/2	1 1/2	3,700	15,630	Butte & Sup. Mining.....	10									Nil
7 1/2	3 1/2	5 1/2	7 1/2	2 1/2	15 1/2	2 1/2	22,100	40,000	Butte Copper & Zinc.....	5									0.34
25 1/2	16 1/2	25 1/2	25 1/2	8 1/2	45 1/2	6 1/2	600	2,339	Certain-Teed Products.....	No									Nil
50 1/2	47 1/2	50 1/2	47 1/2	64 1/2	44 1/2	44 1/2	5,800	40,000	7% cum. pfd.....	100									Nil
105 1/2	82 1/2	84 1/2	111 1/2	73 1/2	199 1/2	65 1/2	116,700	201,120	Colgate-Palmolive-Peet.....	No									4.03
20 1/2	17 1/2	17 1/2	21 1/2	15 1/2	38 1/2	14 1/2	204,900	930,200	Columbian Carbon.....	No									7.84
85 1/2	77 1/2	79 1/2	86 1/2	76 1/2	111 1/2	65 1/2	58,100	176,500	Comm. Solvents.....	No									1.51
152 1/2	147 1/2	149 1/2	152 1/2	146 1/2	151 1/2	140 1/2	510	1,670	Corn Products.....	25									5.49
21 1/2	17 1/2	17 1/2	23 1/2	13 1/2	43 1/2	10 1/2	19,000	173,200	7% cum. pfd.....	100									62.59
18 1/2	17 1/2	17 1/2	19 1/2	13 1/2	42 1/2	11 1/2	2,100	9,400	Davison Chem. Co.....	No							Yr. Je. '30	4.00	
109 1/2	109 1/2	109 1/2	109 1/2	102 1/2	114 1/2	99 1/2	10	140	Devoe & Reynolds "A".....	No								2.24	4.52
107 1/2	93 1/2	95 1/2	107 1/2	83 1/2	145 1/2	80 1/2	270,000	792,600	7% cum. 1st pfd.....	100									67.59
122 1/2	120 1/2	122 1/2	122 1/2	118 1/2	123 1/2	114 1/2	3,500	9,400	DuPont de Nemours.....	20								4.64	6.99
177 1/2	161 1/2	162 1/2	185 1/2	143 1/2	255 1/2	142 1/2	98,100	364,905	6% cum. deb.....	100									78.54
132 1/2	130 1/2	132 1/2	128 1/2	134 1/2	120 1/2	120 1/2	50	770	Eastman Kodak.....	No									9.57
43 1/2	35 1/2	37 1/2	43 1/2	28 1/2	55 1/2	24 1/2	235,000	405,000	6% cum. pfd.....	100									356.89
47 1/2	30 1/2	32 1/2	47 1/2	24 1/2	71 1/2	22 1/2	131,000	241,700	Freeport Texas Co.....	No									5.60
14 1/2	11 1/2	11 1/2	16 1/2	8 1/2	38 1/2	7 1/2	20,000	114,500	General Asphalt Co.....	No									4.71
73 1/2	66 1/2	66 1/2	78 1/2	65 1/2	105 1/2	63 1/2	150	1,980	Glidden Co.....	No							Yr. Oct. '30	Nil	
58 1/2	50 1/2	50 1/2	58 1/2	50 1/2	85 1/2	50 1/2	1,700	2,600	7% cum. prior pref.....	100							Yr. Oct. '30	Nil	
119 1/2	117 1/2	117 1/2	119 1/2	117 1/2	123 1/2	116 1/2	270	910	Hercules Powder Co.....	100								2.91	5.95
83 1/2	67 1/2	75 1/2	86 1/2	45 1/2	124 1/2	31 1/2	57,400	162,500	7% cum. pfd.....	100									38.16
4 1/2	3 1/2	3 1/2	5 1/2	3 1/2	8 1/2	3 1/2	6,600	21,700	Industrial Rayon.....	No									7.26
49 1/2	47 1/2	47 1/2	51 1/2	45 1/2	67 1/2	42 1/2	1,100	4,700	Intern. Agric.....	No							Yr. Je. '30	1.68	
20 1/2	17 1/2	18 1/2	20 1/2	13 1/2	44 1/2	12 1/2	774,500	2,234,200	7% cum. prior pfd.....	100							Yr. Je. '30	14.58	
40 1/2	35 1/2	36 1/2	42 1/2	35 1/2	51 1/2	31 1/2	47,200	290,900	Intern. Nickel.....	No									1.47
80 1/2	66 1/2	70 1/2	80 1/2	52 1/2	148 1/2	48 1/2	343,700	762,600	Intern. Salt.....	No									11.32
16 1/2	10 1/2	15 1/2	16 1/2	10 1/2	25 1/2	8 1/2	4,600	7,200	Johns-Manville Corp.....	No									8.09
54 1/2	41 1/2	43 1/2	55 1/2	41 1/2	81 1/2	39 1/2	50,500	98,100	Kellogg (Spencer).....	No									2.36
15 1/2	11 1/2	13 1/2	17 1/2	11 1/2	37 1/2	10 1/2	22,500	80,300	Liquid Carbonic Corp.....	No							Yr. Sep. '30	5.22	
36 1/2	33 1/2	33 1/2	37 1/2	31 1/2	49 1/2	25 1/2	2,100	13,700	McKesson & Robbins.....	No									1.90
25 1/2	22 1/2	22 1/2	25 1/2	19 1/2	39 1/2	20 1/2	700	4,700	1,073,000	conv. 7% cum. pref.....	50								2.65
27 1/2	24 1/2	25 1/2	31 1/2	23 1/2	51 1/2	30 1/2	30,165	278,965	428,180	MacAndrews & Forbes.....	No								9.43
125 1/2	125 1/2	125 1/2	125 1/2	119 1/2	136 1/2	115 1/2	10	360	340,000	Mathieson Alkali.....	No								3.13
26 1/2	23 1/2	23 1/2	26 1/2	20 1/2	63 1/2	18 1/2	6,800	21,200	650,000	7% cum. pfd.....	100								2.96
35 1/2	29 1/2	32 1/2	36 1/2	19 1/2	39 1/2	18 1/2	90,400	177,400	28,000	Monsanto Chem.....	No								93.91
128 1/2	120 1/2	132 1/2	138 1/2	189 1/2	114 1/2	114 1/2	2,700	9,200	416,000	National Dist. Prod.....	No								4.25
141 1/2	140 1/2	140 1/2	141 1/2	135 1/2	144 1/2	135 1/2	850	1,840	252,000	National Lead.....	100								1.42
119 1/2	118 1/2	119 1/2	118 1/2	118 1/2	120 1/2	116 1/2	460	2,020	310,000	7% cum. "A" pfd.....	100								25.49
53 1/2	42 1/2	48 1/2	53 1/2	42 1/2	85 1/2	30 1/2	1,300	3,000	244,000	6% cum. "B" pfd.....	100								41.95
45 1/2	39 1/2	39 1/2	46 1/2	37 1/2	55 1/2	26 1/2	37,800	142,600	103,000	Newport \$3 cum. conv. "A".....	50								82.47
71 1/2	67 1/2	68 1/2	71 1/2	63 1/2	78 1/2	52 1/2	28,900	81,100	33,000	Penick & Ford.....	No								29.79
101 1/2	92 1/2	93 1/2	101 1/2	93 1/2	114 1/2	90 1/2	31,500	127,200	425,000	7% cum. pfd.....	100								3.97
39 1/2	37 1/2	37 1/2	42 1/2	37 1/2	56 1/2	36 1/2	29,000	72,600	9,000	Procter & Gamble.....	No								73.33
29 1/2	22 1/2	22 1/2	30 1/2	22 1/2	57 1/2	19 1/2	22,500	3,390	6,410,000	Pure Oil Co.....	25								
49 1/2	42 1/2	43 1/2	51 1/2	42 1/2	75 1/2	42 1/2	99,700	263,500	3,038,000	8% cum									

1931 Mar.		1931		1930		In Mar.	Sales During 1931	ISSUES	Par \$	Shares Listed	An. Rate	Earnings \$-per share-\$	
High	Low	Last	High	Low	High							1930	1929
11	11	11	11	11	51	11	6,200	17,600 Brit. Celanese Am. Rets.	2.43	2,806,000			0.03
58	48	...	59	48	90	48	400	775 7% cum. part. 1st pfd.	100	148,000	7.00		14.50
80	78	...	80	68	90	70	325	980 7% cum. prior pfd.	100	115,000	7.00		25.70
...	...	...	...	...	20	3	...	6,340 Celluloid Corp.	No	195,000			1.76
...	...	...	...	...	103	90	...	7% cum. 1st part. pfd.	No	24,000	7.00		8.59
7	7	7	9	7	13	8	500	1,900 Courtaulds, Ltd.	12				0.34
51	49	...	51	45	100	49	300	2,100 Dow Chemical	No	630,000	2.00		4.08
68	63	64	75	65	166	58	28,800	87,400 Gulf Oil	25	4,525,000	1.50		9.83
13	11	...	13	11	23	10	800	1,600 Heyden Chemical Corp.	10	150,000			3.08
...	...	...	...	...	7	4	...	Imperial Chem. Ind.	12				0.49
...	...	...	...	...	16	3	...	Monroe Chem.	No	126,000			2.54
60	56	55	60	47	79	45	1,400	1,800 Shawinigan W. & P.	No	2,178,000	2.50		2.35
66	65	66	66	60	85	58	150	750 Sherwin-Williams Co.	25	636,000	4.00	Yr. Aug. '30 4.14	
9	7	7	12	5	34	3	2,500	15,900 Silica Gel Corp.	No	600,000			
34	30	30	38	30	59	30	146,600	368,300 Standard Oil Ind.	25	16,851,000	2.50		4.66
30	28	28	30	28	34	27	6,000	18,900 Swift & Co.	25	6,000,000	2.00		2.18
12	7	7	16	3	22	3	22,000	Tubize "B"	No	600,000	10.00		
...	...	...	...	...	...	...	...	United Chemicals					
28	24	...	28	14	44	14	6,500	16,100 \$3 cum. part. pfd.	No	115,000	3.00		7.66
CLEVELAND													
83	80	81	94	80	96	91	349	935 Cleve-Cliffs Iron, \$5 pfd.	No	498,000	5.00		11.42
68	55	66	68	55	85	57	2,246	7,560 Sherwin-Williams Co.	25	636,000	4.00	Yr. Aug. '30 4.14	
CHICAGO													
39	36	39	39	35	46	33	1,250	2,500 Abbott Labs.	No	145,000	2.50		3.32
5	4	5	5	4	15	3	200	2,280 Monroe Chem.	No	126,000			
26	23	25	26	21	35	15	200	620 \$3.50 cum. pref.	No	30,000	3.50		13.35
...	...	...	...	...	33	27	...	Swift & Co.	25	6,000,000	2.00		2.18
CINCINNATI													
71	68	68	71	61	110	53	3,080	11,542 Procter & Gamble	No	6,410,000	2.40	Yr. Je. '30	3.36
PHILADELPHIA													
78	62	62	81	62	100	89	400	900 Pennsylvania Salt	50	150,000	5.00	Yr. Je. '30	7.97
MONTREAL													
50	40	40	50	40	...	...	110	260 Asbestos Corp.	No	200,000			Nil
...	...	...	1	1	...	...	...	50 7% non-cum pfd.	100	75,000			0.24

The Industry's Bonds

1931 Mar.		1931		1930		In Mar.	Sales During 1931	ISSUE	Date Due	Int. %	Int. Period	Out- standing \$
High	Low	Last	High	Low	High							
NEW YORK STOCK EXCHANGE												
105½	104½	104½	105½	102½	105½	102	48	240 Amer. Agric. Chem., 1st ref. s. f. 7½s.	1941	7½	F. A.	7,667,000
95½	94	95	99	92	100½	93	29	80 Amer. Cyan. deb. 5s.	1942	5	A. O.	4,554,000
102	100	101	102	96½	177	94½	461	1,736 Amer. I. G. Chem. conv. 5½s.	1949	5½	M. N.	29,933,000
103½	102	103½	104½	102	104	101	240	867 Am. Smelt & Ref. 1st 5s. "A"	1947	5	A. O.	36,578,000
87	79	81	87	65½	98	67	178	451 Anglo-Chilean s. f. deb. 7s.	1945	7	M. N.	14,600,000
102½	101	102½	103	101	103	100	149	397 Atlantic Refin. deb. 5s.	1937	5	J. J.	14,000,000
104	103	103	104	102	105	100½	225	328 Interlake Iron Corp. 1st 5½s. "A"	1945	5½	M. N.	6,629,000
103	103	103	104½	102½	104	97½	2	23 Corn Prod. Refin. 1st s. f. 5s.	1934	5	M. N.	1,822,000
75½	58	67½	75½	40	87½	38	1,205	2,216 Lautaro Nitrate conv. 6s.	1954	6	J. J.	32,000,000
93	90	91	96	85½	100½	87	127	290 Pure Oil s. f. 5½% notes	1937	5½	F. A.	17,500,000
98½	97	97	103	88	104	93½	116	339 Solvay Am. Invest. 5% notes	1942	5	M. S.	15,000,000
104½	103	103	105½	102	104	100	499	1,435 Standard Oil, N. J. deb. 5s.	1946	5	F. A.	120,000,000
102	98	98	106	98	104	96½	437	1,627 Standard Oil, N. Y. deb. 4½s.	1951	4½	J. D.	50,000,000
97	95½	95½	99	89½	102	90½	18	66 Tenn. Corporation deb. 6s. "B"	1944	6	M. S.	3,308,000
NEW YORK CURB												
105	104½	105	105	102½	104½	100½	285,000	667,000 Aluminum Co., s. f. deb. 5s.	1952	5	M. S.	37,115,000
100½	100½	100½	104½	97	104½	96½	101,000	363,000 Aluminum Ltd., 5s.	1948	5	J. J.	20,000,000
56	54	56	56	53	60	51	10,000	23,000 Amer. Solv. & Chem. 6½s.	1936	6½	M. S.	1,737,000
38	35	38	38	29½	45	35	18,000	33,000 General Ind. Ale., 6½s.	1944	6½	M. N.	2,351,000
50½	45½	49½	53	45	80	51	47,000	177,000 General Rayon 6s. "A"	1948	6	J. D.	5,085,000
103	101	102	103	100½	104	90½	113,000	555,000 Gulf Oil, 5s.	1937	5	J. D.	30,414,000
104	102	102	104	101	104	99	97,000	358,000 Sinking Fund deb. 5s.	1947	5	F. A.	35,000,000
102½	102½	100	102	99½	103	95½	224,000	556,000 Koppers G. & C. deb. 5s.	1947	5	J. D.	23,050,000
97	95	97	97	92½	98	90	282,000	1,001,000 Shawinigan W. & P. 4½s. "A"	1967	4½	A. O.	35,000,000
97	95	97	97	94	98	90	83,000	393,000 4½s., series "B"	1968	4½	M. N.	16,108,000
94	94	94	94	90	107	96	12,000	55,000 Silica Gel Corp. 6½s.	1932	6½	A. O.	1,700,000
103½	102	102	103	102	103	79½	136,000	290,000 Swift & Co., 5s.	1944	5	J. J.	22,916,000
102½	102½	102	103	101	103	100	45,000	97,000 Westvaco Chlorine Prod. 5½s.	1937	5½	M. S.	1,992,000

Apr. '31: XXVIII, 4

Chemical Markets

415

Ammonium Persulfate Potassium Persulfate

MANUFACTURED BY
BUFFALO ELECTROCHEMICAL CO.

SOLE SELLING AGENTS

JOSEPH TURNER & Co.

19 Cedar St.



New York City

Cellulose Acetate

Uniformity and Stability

Acetic Anhydride

90/95%

Anhydrous Sodium Acetate

Cresylic Acid

Pale 97/99%

Casein

for all purposes

PLASTICIZERS

for

Cellulose Acetate and Nitrocellulose

in

*Lacquers, Dopes
and Plastics*

— — —

Dibutyl Phthalate

Diethyl Phthalate

Dimethyl Phthalate

Dibutyl Tartrate

Triphenyl Phosphate

Our Telephone numbers are Ashland 4-2265 and 2266 and 2229

AMERICAN-BRITISH CHEMICAL SUPPLIES

INCORPORATED

180 Madison Avenue

NEW YORK CITY

Associated Companies: Chas. Tennant & Co., Ltd.
Glasgow-Belfast-Dublin

Barter Trading Corp., Ltd.
London-Brussels

The Trend of Prices

IMPORTANT PRICE CHANGES

Advances	March	February
Blood, dried.....	\$2.85	\$2.70
Bismuth Subnitrate.....	1.50	1.35
Declines		
Acid, Citric.....	.37	.40
Alcohol C. D. 5, tanks.....	.19	.37
Casein, standard domestic.....	.08	.08½
Copper.....	.09½	.10½
Ethyl Acetate, tanks.....	.07½	.08
Glycerine, dynamite.....	.10	.10½
Quicksilver.....	\$101.00	\$103.00

The severe drop in alcohol prices featured what would otherwise have been a very dull and listless month in the chemical markets. Here and there encouraging signs of trade revival were noted, specially the spectacular flurry in shellac and a revival of buying in the wax markets with a resulting stiffening of prices in many items. The volume in most of the industrial chemicals was better against existing contracts, but the total of new and spot business was not very encouraging. If the alcohol prices had held to last months level, the **CHEMICAL MARKETS** average price for fifteen representative chemicals would have failed to register a decline for the first time in eleven months.

Seasonal Activity

Several of the seasonal chemicals showed signs of greater activity, inquiries for calcium chloride, copper sulfate, sodium chlorate and anhydrous ammonia forecasting good demand in these items. The plating trades were operating at better schedules. Shipments of coal-tar chemicals and derivatives were heavier, and a revival in the textile industry brought further demands for dyestuffs and processing chemicals. Tanstuffs, however, did not enjoy any improvement as the leather industry is still unable to point to indications of expansion. Shipments of alkalies into the soap industry were larger, but the total volume for the first three months is considerably below the same period a year ago. Waxes were much stronger, gums were weaker, rosin prices were slightly higher, and the oils and fats appeared to be gradually emerging from their low state. Cod liver, and castor oils were very strong.

The solvent market continues to drag with prices still very much unsettled. As the month closed, producers of ethyl acetate announced a reduction of ½c, the largest of a long series of reductions. Just what effect the 16c reduction in alcohol will have on related chemicals was not

definitely apparent as the month closed, but it was expected that further declines in several products would follow. Several reasons were advanced for the failure of the alcohol market to hold prices at a better level. In the last analysis the presence of large surplus stocks was the compelling cause. The mild weather during the past winter failed to permit the alcohol producers an opportunity to move these stocks into consuming channels.

In the fine chemical market all grades of glycerine were soft and further concessions were made in citric acid and the citrates. Quicksilver was again lowered.

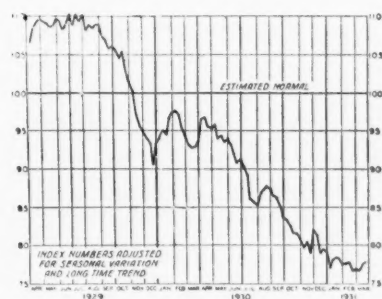
Business Generally

Mixed sentiments continued to govern the business outlook of the country. Once again the tempo of activity in many lines has slowed down after encouraging indications of a major swing to higher levels. The bullish viewpoint of February gave away in the last two weeks of March to misgivings that the stocks market rally of

the previous month was not justified by actual conditions.

Retail trade was decidedly better with the approach of Easter. Wholesale trade was said to be taking notice of dwindling inventories and preparing to buy in sizable quantities. Spring-like weather favored conditions in certain industries, but raw commodity markets almost without exception, were again down after the February spurt. The announced withdrawal of the Farm Board from the Chicago Wheatpit was sufficient reason for fresh selling and new lows in the grains. Rubber declined to the lowest price on record.

Steel mill activity dropped slightly towards the end of the month caused by a slight recession in automobile manufacturing, but further improvement is looked for shortly with the building industry showing sizable gains. In the money



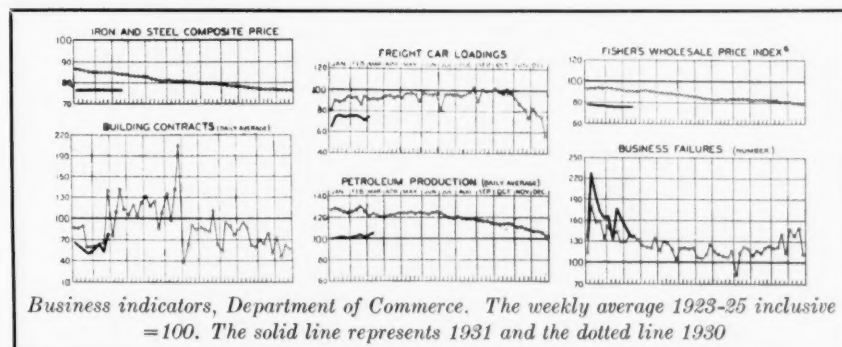
New York Times Index of General Business Activity rises slightly in March

market conditions were unchanged from last month, money still continuing to be available at extremely low levels.

Unquestionably we are now passing through that stage where for several months business and the indices of business will show puzzling contradictions.

Indices of Business

	Latest Available Month	Previous Month	Year Ago
Automobile Production, Feb.....	6,110	6,359	7,091
†Brokers Loans March 28.....	\$1,908	\$1,913	\$3,820
*Building Contracts, Feb.....	\$235,405	\$227,956	\$317,053
*Car Loadings, March 28.....	734	723	881
†Commercial Paper, Jan. 31.....	\$327	\$327	\$405
Factory Payrolls, Feb.....	73.2	68.4	97.7
*Mail Order Sales, Jan.....	\$41,459	\$72,486	\$47,168
Number of Failures Dun, Feb.....	\$59,607	\$94,608	\$51,326
*Merchandise Imports, Feb.....	\$175,000	\$183,000	\$281
*Merchandise Exports, Feb.....	\$226,000	\$250,000	\$348,962
Furnaces in Blast ½ March 1.....	34.4	32.5	56.3
*Steel Unfinished Orders, Feb. 28.....	3,965	4,132	4,479
*000 omitted.			
†000,000 omitted.			



Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tan-stuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Naval Stores, Fatty Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Imported chemicals are so designated. Resale stocks when a market factor are quoted in addition to makers' prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations

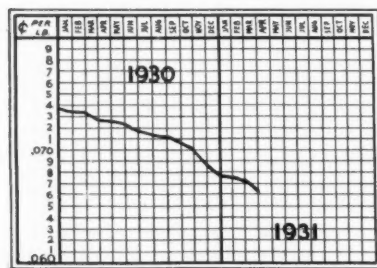
f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

The CHEMICAL MARKETS average price for industrial chemicals was again lower in March due to the sudden decline in alcohol prices. Until the break in this market occurred, it appeared likely that March would be the first month in an eleven-month period to show a break in the down-



ward trend. The March average price for the fifteen representative chemicals that compose the list stood at .0662c against .0671c for February, a loss of .0009c. Aside from the lower price for alcohol the remaining members of the group remained stationary, registering neither gains or losses.

Acetone — The market in this commodity was quiet during March with sales and shipments largely restricted to replacement of existing stocks in the hands of consumers. Little buying of a forward nature was in evidence. A slight improvement was felt in the lacquer and plastic fields. Prices were firm and unchanged.

Acid Acetic — With the textile industry recovering rapidly from the slump, the demand from the dyeing centers was up. The volume of acid being shipped has shown a slow but steady improvement since the first of the year and the competitive position is very much lessened.

Acid Citric — Reflecting the weak position of the citrates, leading manufacturers announced on March 24th a further reduction. The present quotations are based on 37c per lb., in barrels for U. S. P., granular and crystal, kegs, 1/2c higher, f. o. b. N. Y. City. Powdered is 1/2c higher than the crystal.

Acid Lactic — Under the influence of better demand from the tanning industry shipments were in better volume during the last two weeks of the month than they have been for some time.

	Current Market	Low	1931 High	High	1930 Low	High	1929 Low
Acetaldehyde, drs 1c-1 wks...lb.	.18½	.21	.18½	.21	.21	.18½	.21
Acetaldol, 50 gal dr...lb.	.27	.31	.27	.31	.31	.27	.31
Acetamide...lb.	.95	1.35	.95	1.35	1.35	1.20	.30
Acetanilid, tech, 150 lb bbl...lb.	.20	.23	.20	.23	.23	.21	.24
Acetic Anhydride, 92-95%, 100 lb ebys...lb.	.21	.25	.21	.25	.25	.25	.28
Acetin, tech drums...lb.	.30	.32	.30	.32	.32	.30	.32
Acetone, tanks...lb.	.10	.10½	.10	.10½	.12	.11	.16
Acetone Oil, bbls NY...gal.	1.15	1.25	1.15	1.25	1.25	1.15	1.25
Acetyl Chloride, 100 lb oby...lb.	.55	.68	.55	.68	.68	.55	.68
Acetylene Tetrachloride (see tetrachlorethane)							
Acids							
Acid Acetic, 28% 400 lb bbls c-1 wks...100 lb.	2.60		2.60	3.88	2.60	3.88	3.88
Glacial, bbl c-1 wk...100 lb.	9.23		9.23	13.68	9.23	13.68	13.68
Glacial, tanks...lb.	8.98		8.98	13.43	8.98		
Anthranilic, retd, bbls...lb.	.85	.95	.85	1.00	.85	1.00	.98
Technical, bbls...lb.	.65	.70	.65	.80	.75	.80	.80
Battery, ebys...100 lb.	1.60	2.25	1.60	2.25	1.60	2.25	1.60
Benzoic, tech, 100 lb bbls...lb.	.40	.45	.40	.45	.40	.40	.51
Boric, crys. powd, 250 lb bbls...lb.	.06½	.07	.06½	.07½	.06½	.07½	.05½
Broenner's, bbls...lb.	1.20	1.25	1.20	1.25	1.20	1.25	1.25
Butyric, 100% basis ebys...lb.	.80	.85	.80	.85	.90	.80	.85
Camphoric...lb.	5.25		5.25	5.25	5.25	5.25	4.85
Chlorosulfonic, 1500 lb drums wks...lb.	.04½	.05½	.04½	.05½	.04½	.05½	.04½
Chromic, 99% drs extra...lb.	.15	.17	.15	.17	.15	.23	.17½
Chromotropic, 300 lb bbls...lb.	1.00	1.06	1.00	1.06	1.00	1.06	1.00
Citric, USP, crystals, 230 lb bbls...lb.	.37	.37½	.37	.43	.59	.40	.46
Cleve's, 250 lb bbls...lb.	.52	.54	.52	.54	.52	.59	.52
Cresylic, 95%, dark drs NY...gal.	.47	.60	.47	.60	.70	.54	.60
97-99%, pale drs NY...gal.	.50	.60	.50	.60	.77	.58	.72
Formic, tech 90%, 140 lb oby...lb.	.10½	.12	.10½	.12	.10½	.12	.10½
Gallie, tech, bbls...lb.	.60	.70	.60	.70	.55	.50	.50
USP, bbls...lb.	.74	.74	.74	.74	.74	.55	.74
Gamma, 225 lb bbls wks...lb.	.77	.80	.77	.80	.77	.80	.74
H, 225 lb bbls wks...lb.	.65	.70	.65	.70	.65	.99	.80
Hydriodic, USP, 10% soln oby lb.	.67	.67	.67	.67	.67	.72	.67
Hydrobromic, 48%, coml, 155 lb ebys wks...lb.	.45	.48	.45	.48	.45	.48	.45
Hydrochloric, CP, see Acid Muriatic							
Hydrocyanic, cylinders wks...lb.	.80	.90	.80	.90	.80	.90	.80
Hydrofluoric, 30%, 400 lb bbls wks...lb.	.06	.06	.06	.06½	.06	.06	.06
Hydrofluosilicic, 35%, 400 lb bbls wks...lb.	.11	.12	.11	.12	.11	.11	.11
Hypophosphorous, 30%, USP, demijohns...lb.	.85	.85	.85	.85	.85	.85	.85
Lactic, 22%, dark, 500 lb bbls lb.	.04	.04½	.04	.04½	.05	.04	.04½
44%, light, 500 lb bbls...lb.	.11½	.12	.11½	.12	.11	.12½	.11
Laurent's, 250 lb bbls...lb.	.36	.42	.36	.42	.36	.42	.40
Malic, powd., kegs...lb.	.45	.60	.45	.60	.45	.60	.48
Metanilic, 250 lb bbls...lb.	.60	.65	.60	.65	.60	.65	.60
Mixed Sulfuric-Nitric...lb.	.07	.07½	.07	.07½	.07	.07½	.07
tanks wks...N unit	.008	.01	.008	.01	.008	.01	.008
tanks wks...S unit	.20	.30	.20	.30	.18	.21	.18
Monochloroacetic, tech bbl...lb.	1.65	1.70	1.65	1.70	1.65	1.70	1.65
Monosulfonic, bbls...lb.							
Muriatic, 18 deg, 120 lb ebys c-1 wks...100 lb.	1.35		1.35	1.35	1.35	1.40	1.35
tanks, wks. 100 lb.	1.00		1.00	1.00	1.00	1.00	1.00
20 degrees, ebys wks...100 lb.	1.45		1.45		1.45		1.45
N & W, 250 lb bbls...lb.	.85	.95	.85	.95	.85	.95	.85
Naphthionic, tech, 250 lb bbls...lb.	Nom.		Nom.		Nom.		.59
Nitric, 36 deg, 135 lb ebys c-1 wks...100 lb.	5.00		5.00	5.00	5.00	5.00	5.00
40 deg, 135 lb ebys, c-1 wks...100 lb.	6.00		6.00	6.00	6.00	6.00	6.00
Oxalic, 300 lb bbls wks NY...lb.	.11	.11½	.11	.11½	.11	.11½	.11
Phosphoric 50%, U. S. P...lb.	.14	.14	.14	.14	.14	.14	.08
Syrupy, USP, 70 lb drs...lb.	.14	.14	.14	.14	.14	.16	.14
Commercial, tanks...Unit.	.80	.80	.80	.80	.80		
Picramic, 300 lb bbls...lb.	.65	.70	.65	.70	.65	.70	.65
Picric, kegs...lb.	.30	.50	.30	.50	.30	.50	.30
Pyrogallie, crystals...lb.	1.50	1.60	1.50	1.60	1.30	1.40	.86
Salicylic, tech, 125 lb bbl...lb.	.33	.37	.33	.37	.33	.42	.33
Sulfanilic, 250 lb bbls...lb.	.15	.16	.15	.16	.15	.16	.15
Sulfuric, 66 deg, 180 lb ebys 1c-1 wks...100 lb.	1.60	1.95	1.60	1.95	1.60	1.95	1.60
tanks, wks. ton	15.00		15.00	15.50	15.00	15.50	15.50
1500 lb dr wks...100 lb.	1.50	1.65	1.50	1.65	1.50	1.65	1.50
60°, 1500 lb dr wks...100 lb.	1.27½	1.42½	1.27½	1.42½	1.27½	1.42½	1.27½
Oleum, 20%, 1500 lb. drs 1c-1 wks...ton	18.50		18.50	18.50	18.50	18.50	18.50

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

Acid Oxalic — While there was a slight falling off in demand, the volume for the month was reported as satisfactory and prices ruled firm and unchanged from the previous month.

Alcohol — A severe competitive situation in the alcohol market developed during the month. C. D. No. 5 was openly quoted at 19c a gallon for April delivery as against last month's price of 35-37c. Apparently the reason for this serious decline is similar to the situation in the alkali field last fall. With possible tonnages much smaller than those available in the last two years producers were seeking business avidly and were willing to make large concessions for contracts. While the published reductions were to apply to April only it was rumored that in some quarters these prices were being offered for longer periods. That the sale of anti-freeze alcohol was a distinct disappointment is an open secret as is also the fact that the alcohol companies are carrying large surplus stocks as a consequence of this restriction and the reduction in tonnage going into industrial lines. It was reported that the present carry-over is as high as 60,000,000 to 80,000,000 gallons, close to a year's requirements based on present demands. The excitement in the chemical industry caused by the "news" of the break in alcohol prices was only exceeded by that displayed when the alkali prices went down last fall. In some respects the news about the alcohol situation caused greater excitement as the decline was more sudden and generally unexpected.

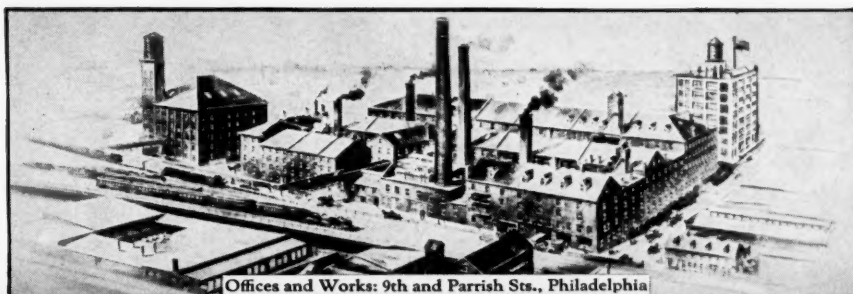
Ammonia, Anhydrous — Manufacturers were satisfied with the volume of shipments going into consuming channels. Prices remained firm and unchanged.

Ammonium Sulfate — Conditions appeared better during March than they were in the previous month and the volume of sales and the movement of stocks against contracts was reported as being much better. In some sections of the country ammonium sulfate stocks were said to be rather low. The price at Atlantic ports remained unchanged at \$35 to \$36 a ton.

Amyl Acetate — During the period under review shipments were in better volume than in the previous month.

Antimony — The rise in the silver market in the third week of the month helped to strengthen the antimony market, but published prices remained unaltered. The Department of Commerce reports 5,918 tons of Chinese antimony, including needle, imported into the United States during 1930, a decrease of almost 3,500 tons from 1929. Imports from all sources totaled 7,595 tons, a decrease of 4,400 tons from the year previous.

	Current Market	Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
40%, 1c-1 wks net.....ton	42.60		42.00	42.00	42.00	42.00	42.00
Tannic, tech, 300 lb bbls...lb.	.23	.40	.23	.40	.23	.40	.30
Tartaric, USP, gran. powd, 300 lb bbls...lb.	.31½		.31½	.38½	.33	.38½	.38
Tobias, 250 lb bbls...lb.	.85		.85	.85	.85	.85	.85
Trichloroacetic bottles...lb.	2.75		2.75	2.75	2.75	2.75	2.75
Kegs...lb.	2.00		2.00	2.00	2.00	2.00	2.00
Tungstic, bottles...lb.	1.40	1.70	1.40	1.70	1.40	2.25	1.00
Albumen, blood, 225 lb bbls...lb.	.38	.40	.38	.40	.38	.47	.38
dark...bbls, lb.	.12	.20	.12	.20	.12	.20	.12
Egg, edible...lb.	.55	.55	.55	.56	.55	.83	.70
Technical, 200 lb cases...lb.	.50	.55	.50	.55	.50	.80	.70
Vegetable, edible...lb.	.60	.65	.60	.65	.60	.65	.60
Technical...lb.	.50	.55	.50	.55	.50	.55	.50
Alcohol							
Alcohol Butyl, Normal, 50 gal drs c-1 wks...lb.	.16½	.17½	.16½	.17½	.18½	.17½	.17½
Drums, 1-c-1 wks...lb.	.16½	.17½	.16½	.17½	.18½	.17½	.17½
Tank cars wks...lb.	.15½	.16½	.15½	.16½	.17½	.16½	.16½
Amyl (from pentane) Tanks wks...lb.	.236		.236	.236	.236	1.67	1.67
Diacetone, 50 gal drs del. gal.	1.42	1.60	1.42	1.60	1.60	1.42	1.80
Ethyl, USP, 190 pf, 50 gal bbls...gal.	2.37	2.37	2.75	2.75	2.63	2.75	2.69½
Anhydrous, drums...gal.	.54	.58	.54	.60	.71	.56	.71
Completely depatured, No. 1, 188 pf, 50 gal drs drums extra...gal.	.27	.29	.40	.47	.51	.40	.52
No. 5, 188 pf, 50 gal drs drums extra...gal.	.27	.29	.27	.44	.50	.40	.51
Tank, cars...gal.	.24	.24	.38	.48	.37	.50	.46
Isopropyl, ref, gal drs...gal.	.90	1.00	.90	1.00	1.00	1.30	1.00
Propyl Normal, 50 gal dr. gal.	1.00		1.00	1.00	1.00	1.00	1.00
Alcotate, tanks...gal.	.60	.60	.60				
Aldehyde Ammonia, 100 gal dr lb.	.80	.82	.80	.82	.80	.82	.80
Alpha-Naphthol, crude, 300 lb bbls...lb.	.60	.65	.60	.65	.60	.65	.65
Alpha-Naphthylamine, 350 lb bbls...lb.	.32	.34	.32	.34	.32	.34	.32
Alum Ammonia, lump, 400 lb bbls, 1c-1 wks...100 lb.	3.20	3.50	3.20	3.50	3.50	3.20	3.25
Chrome, 500 lb casks, wks...100 lb.	4.50	5.25	4.50	5.25	5.25	4.50	5.00
Potash, lump, 400 lb casks wks...100 lb.	3.25	3.50	3.10	3.50	3.50	3.10	3.00
Soda, ground, 400 lb bbls wks...100 lb.	3.50	3.75	3.50	3.75	3.75	3.50	3.75
Aluminum Metal, c-1 NY, 100 lb.	22.90	24.30	22.90	24.30	24.30	24.30	24.30
Chloride Anhydrous...lb.	.05	.09	.05	.09	.15	.05	.20
Hydrate, 96%, light, 90 lb bbls...lb.	.16	.17	.16	.17	.18	.16	.17
Stearate, 100 lb bbls...lb.	.18	.21	.18	.22	.26	.19	.26
Sulfate, Iron, free, bags c-1 wks...100 lb.	1.90	1.95	1.90	1.95	2.05	1.90	2.05
Coml, bags c-1 wks...100 lb.	1.25	1.30	1.25	1.30	1.40	1.25	1.40
Aminooasobenzene, 110 lb kegs lb.	1.15		1.15	1.15	1.15	1.15	1.15
Ammonium							
Ammonia anhydrous Com. tanks	.05½		.05½	.05½	.05½		
Ammonia, anhyd, 100 lb cyl. lb.	.15½		.15½	.15½	.15½	.14½	.14
Water, 26", 800 lb dr del...lb.	.03½		.03½	.03½	.03½	.03½	.03½
Ammonia, aqua 26" tanks...lb.	.02½		.02½	.02½	.02½		
Acetate...lb.	.28	.39	.28	.39	.39	.28	
Bicarbonate, bbls., f.o.b. plant 100 lb.	5.15		5.15	5.15	5.15	6.50	5.15
Bifluoride, 300 lb bbls...lb.	.21	.22	.21	.22	.22	.21	.21
Carbonate, tech, 500 lb ca. lb.	.10½	.12	.09	.12	.12	.09	.09
Chloride, white, 100 lb. bbls wks...100 lb.	4.45	5.15	4.45	5.15	5.15	4.45	4.45
Gray, 250 lb bbls wks...lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.25
Lump, 500 lb cks spot...lb.	.11	.11½	.11	.11½	.11	.11½	.11
Lactate, 500 lb bbls...lb.	.15	.16	.15	.16	.16	.15	.15
Ammonium Linoleate...lb.	.15	.15	.15				
Nitrate, tech, casks...lb.	.06	.10	.06	.10	.10	.06	.06
Persulfate, 112 lb kegs...lb.	.26	.30	.26	.30	.30	.26	.26
Phosphate, tech, powd, 325 lb bbls...lb.	.11½	.12	.11½	.12	.13	.11½	.13
Sulfate, bulk c-1...100 lb.	1.80	1.70	1.80	2.10	1.75	2.40	2.05
Southern points...100 lb.	1.88	1.70	1.75	2.10	1.82½	2.45	2.05
Nitrate, 26% nitrogen 31.6% ammonia imported bags c. i. f...ton	34.60	35.00	34.60	35.00	57.60	45.00	60.85
Sulfocyanide, kegs...lb.	.36	.48	.36	.48	.48	.36	.36
Amyl Acetate, (from pentane) Tanks...lb.	.222		.222	.236	.222	1.70	1.60
Tech, drs...lb.	.225	.236	.225	.236	.24	.225	.23
Alcohol, see Fuel Oil...lb.							
Furoate, 1 lb tins...lb.	5.00		5.00	5.00	5.00		
Aniline Oil, 960 lb drs...lb.	.14½	.16	.14½	.16	.15	.16½	.15
Annatto, fine...lb.	.34	.37	.34	.37	.34	.37	.34
Antraquinone, sublimed, 125 lb bbls...lb.	.50	.55	.50	.55	.90	.50	.80
Antimony, metal slabs, ton lots...lb.	.07	.07½	.07	.07½	.09½	.06½	.08½
Needle, powd, 100 lb ca...lb.	.08½	.09	.08½	.09	.09½	.08	.09
Chloride, soln (butter of cobs)...lb.	.13	.17	.13	.17	.17	.13	.13
Oxide, 500 lb bbls...lb.	.08½	.08½	.08½	.08½	.08½	.07½	.08½
Salt, 66% tins...lb.	.22	.24	.22	.24	.24	.22	.26
Sulfuret, golden, bbls...lb.	.16	.20	.16	.20	.20	.16	.16
Vermilion, bbls...lb.	.38	.42	.38	.42	.42	.38	.42
Archil, conc, 600 lb bbls...lb.	.17	.19	.17	.19	.19	.17	.17
Double, 600 lb bbls...lb.	.12	.14	.12	.14	.14	.12	.14
Triple, 600 lb bbls...lb.	.12	.14	.12	.14	.14	.12	.16
Argols, 80% casks...lb.	.18½		.18½	.18½	.18½	.18½	.18½
Crude, 30%, casks...lb.	.07	.07½	.07	.08	.08	.07½	.08



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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

Bonded stocks of antimony throughout the year decreased about 500 tons and the apparent consumption amounted to approximately 7,500 tons also a sharp reduction from 1929.

Benzol — Further improvement was noticed from consuming centers and shipments were slightly heavier in March than in February. Still, there are strong evidences that buyers are holding purchases to immediate requirements. The price structure was unchanged. Benzol was one of the brightest spots in our 1930 chemical export trade. Benzol stands out with the largest amount ever shipped abroad, or a total of \$9,600,000 worth (44,600,000 gallons).

Bismuth Subnitrate — Leading producers on March 5th advanced their price 15c per pound and are now quoting in lots of 25 lbs or more \$1.50 per lb. The differential on small lots is held at 5c.

Bleaching Powder — No price change was made during the month. Volume was reported to have been better in March than in February.

Blood, Dried — The market in this item stiffened perceptibly during the month, registering a rise of 10c on March 3rd, 5c on March 7th, but losing this last rise a few days later. Stocks are said to be smaller than was generally thought to be in existence. This movement in price was of course in direct contrast with the generally lower prices prevailing for other fertilizer material.

Borax — Shipments continued to be of a routine nature during March. Specially heavy demand came from the enamel industry. Unhampered by any unwieldy surplus stocks of material the price structure remained firm and unchanged, despite the rather light consuming interest.

Calcium Acetate — Slow but steadily improving conditions in this market were in evidence during the past month. Sales were made at \$2. Stocks on hand are not as heavy and withdrawals under existing contracts by acid producers were larger. Nevertheless, the statistical position of lime is still weak because of the size of reserve stocks. It was felt that no reason could be legitimately advanced for a change of price in either direction at this time.

Calcium Chloride — Producers were viewing the situation in a favorable light, encouraged by the large number of inquiries that have already been received. Indications point very definitely to heavy tonnages this summer and production schedules have been keyed to a high rate. Prices under the influence of these factor were very firm.

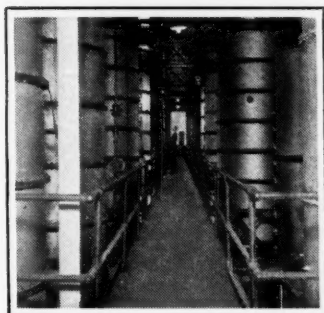
Carbon Black — The price of 3c per lb. for carlot quantities, Texas, remained

	Current Market	Low	1931 High	1930 High	1930 Low	1929 High	1929 Low
Aroclors, wks. lb.	.20	.40	.20	.40	.40	.20	.....
Arsenic, Red, 224 lb kegs, cs. lb.	.09½	.10	.09½	.10	.11	.08½	.11
White, 112 lb kegs. lb.	.04	.05	.03½	.05	.04½	.03½	.04½
Asbestine, c-1 wks. ton	15.00	.....	15.00	15.00	15.00	15.00	4.75
Barium							
Barium Carbonate, 200 lb bags wks. ton	58.00	60.00	58.00	60.00	60.00	58.00	60.00
Chlorate, 112 lb kegs NY. lb.	.14	.15	.14	.15	.15	.14	.15
Chloride, 600 lb bbl wks. ton	63.00	69.00	63.00	69.00	69.00	63.00	69.00
Dioxide, 88%, 890 lb drs. lb.	.12	.13	.12	.13	.13	.12	.13
Hydrate, 500 lb bbls. lb.	.04½	.05½	.04½	.05½	.05½	.04½	.05½
Nitrate, 700 lb casks. lb.	.07½	.08½	.07½	.08½	.08½	.07½	.08½
Barytes, Floated, 350 lb bbls wks. ton	23.00	24.00	23.00	24.00	24.00	23.00	24.00
Bauxite, bulk, mines. ton	5.00	8.00	5.00	8.00	8.00	5.00	8.00
Beeswax, Yellow, crude bags. lb.	.24	.31	.24	.31	.34	.24	.37
Refined, cases. lb.	.....	.37	.....	.37	.38	.37	.42
White, cases. lb.	.34	.36	.34	.36	.33	.34	.53
Benzaldehyde, technical, 945 lb drums wks. lb.	.60	.65	.60	.65	.65	.60	.65
Benzene							
Benzene, 90%, Industrial, 8000 gal tanks wks. gal.	.....	.21	.....	.21	.22	.21	.23
Ind. Pure, tanks works. gal.	.....	.21	.....	.21	.22	.21	.23
Benzidine Base, dry, 250 lb bbls. lb.	.65	.67	.65	.67	.74	.65	.74
Benzoyl Chloride, 500 lb drs. lb.	.45	.47	.45	.47	1.00	.45	1.00
Benzyl Chloride, tech drs. lb.	.....	.30	.....	.30	.25	.25	.25
Beta-Naphthol, 250 lb bbl wk lb.	.22	.24	.22	.24	.24	.22	.26
Naphthylamine, sublimed, 200 lb bbls. lb.	1.25	1.35	1.25	1.35	1.35	1.25	1.35
Tech, 200 lb bbls. lb.	.58	.65	.58	.65	.65	.53	.68
Blanc Fixe, 400 lb bbls wks. ton	75.00	90.00	75.00	90.00	90.00	75.00	90.00
Bleaching Powder							
Bleaching Powder, 300 lb drs c-1 wks contract. 100 lb.	2.00	2.35	2.00	2.35	2.35	2.00	2.00
Blood, Dried, fob, NY. Unit	2.85	3.00	2.70	3.00	3.90	3.00	4.60
Chicago. Unit	.....	2.35	.....	2.35	4.50	2.75	5.00
S. American shipt. Unit	2.95	3.20	2.95	3.20	4.10	3.15	4.70
Blues, Bronze Chinese Milori Prussian Soluble. lb.	.....	.35	.....	.35	.35	.35	.32
Bone, raw, Chicago. ton	31.00	32.00	31.00	32.00	39.00	31.00	42.00
Bone, Ash, 100 lb kegs. lb.	.06	.07	.06	.07	.07	.06	.07
Black, 200 lb bbls. lb.	.05½	.08½	.05½	.08½	.08½	.05½	.08½
Meal, 3% & 50%, Imp. ton	.....	31.00	.....	31.00	31.00	31.00	30.00
Borax, bags. lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½
Bordeaux, Mixture, 16% pwd. lb.	.11½	.13	.11½	.13	.14	.12	.14
Paste, bbls. lb.	.11½	.13	.11½	.13	.14	.12	.14
Brazilwood, sticks, shpmt. lb.	26.00	28.00	26.00	28.00	28.00	26.00	28.00
Bromine, cases. lb.	.36	.43	.36	.43	.47	.38	.....
Bronze, Aluminum, powd blk. lb.	.60	1.20	.60	1.20	1.20	.60	1.20
Gold bulk. lb.	.55	1.25	.55	1.25	1.25	.55	1.25
Butyl Acetate, normal drs. lb.	.17	.175	.17	.175	.20	.17	.195
Tank, wks. lb.	.16	.175	.16	.175	.186	.16	.186
Aldehyde, 50 gal drs wks. lb.	.34	.44	.34	.44	.44	.34	.70
Carbitol (See Diethylene Glycol Mono (Butyl Ether) ....	.....	.....	.....	.....	.....	.....	.....
Cellosolve (see Ethylene glycol mono butyl ether) ....	.....	.....	.....	.....	.....	.....	.....
Furoate, tech, 50 gal. dr. lb.	.....	.50	.....	.50	.50	.50	.50
Propionate, drs. lb.	.22	.25	.22	.25	.27	.22	.36
Stearate, 50 gal drs. lb.	.25	.30	.25	.30	.30	.25	.60
Tartrate, drs. lb.	.55	.60	.55	.60	.60	.55	.60
Cadmium, Sulfide, boxes. lb.	.80	.90	.80	.90	1.75	.90	1.75
Calcium							
Calcium, Acetate, 150 lb bags c-1. 100 lb.	.....	2.00	.....	2.00	4.50	2.00	4.50
Arsenate, 100 lb bbls c-1 wks. lb.	.07	.09	.07	.09	.09	.07	.09
Carbide, drs. lb.	.05	.06	.05	.06	.06	.05	.06
Carbonate, tech, 100 lb bags c-1. lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Chloride, Flake, 375 lb drs c-1 wks. ton	.....	22.75	.....	22.75	22.75	22.75	25.00
Solid, 650 lb drs c-1 fob wks ton	20.00	20.00	20.00	20.00	20.00	20.00	20.00
Nitrate, 100 lb bags. ton	40.00	43.00	40.00	43.00	43.00	40.00	52.00
Peroxide, 100 lb drs. lb.	.....	1.25	.....	1.25	1.25	1.25	1.25
Phosphate, tech, 450 lb bbls lb.	.08	.08½	.08	.08½	.08½	.08	.08
Stearate, 100 lb bbls. lb.	.18	.22	.18	.22	.26	.19	.26
Calurea, bags S. points. c.i.f. ton	.....	88.65	.....	88.65	88.65	88.65	82.15
Camwood, Bark, ground bbls. lb.	.....	.18	.....	.18	.18	.18	.18
Candelilla Wax, bags. lb.	.14	.15	.13	.15	.20	.15	.24
Carbitol, (See Diethylene Glycol Mono Ethyl Ether) ....	.....	.....	.....	.....	.....	.....	.....
Carbon, Decolorizing, 40 lb bags c-1. lb.	.08	.15	.08	.15	.15	.08	.15
Black, 100-300 lb cases 1c-1 NY. lb.	.06	.12	.06	.12	.12	.06	.12
Bisulfite, 500 lb drs 1c-1 NY. lb.	.05½	.06	.05½	.06	.06	.05½	.06
Dioxide, Liq. 20-25 lb cyl. lb.	.....	.06	.....	.06	.18	.06	.06
Tetrachloride, 1400 lb drs delivered. lb.	.06½	.07	.06½	.07	.07	.06½	.07½
Carnauba Wax, Flor, bags. lb.	.26	.28	.26	.28	.37	.28	.43
No. 1 Yellow, bags. lb.	.....	.28	.....	.28	.33	.25	.40
No. 2 N Country, bags. lb.	.....	.20	.....	.20	.27	.20	.32
No. 2 Regular, bags. lb.	.22	.23	.21	.23	.30	.23	.36
No. 3 N. C. lb.	.15	.15½	.14½	.15	.23	.16	.25
No. 3 Chalky. lb.	.14½	.15	.14	.15	.23	.16	.26
Casein, Standard, Domestic. ground. lb.	.08	.08½	.08	.10	.15½	.09½	.17

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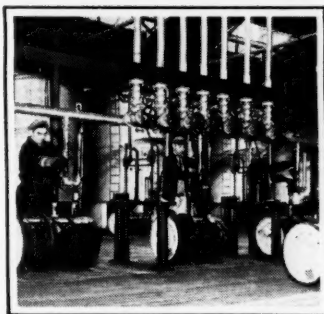
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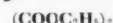
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ETHYL OXALATE

(*Diethyl Oxalate*)



SPECIFICATIONS

Color & Properties:

Colorless liquid

Constants:

Ester—at least 97%
Sp. gr. 1.077 at 20°/20°C.
Wt. per gal. 8.96 lb.
Acidity: not over 0.1% as oxalic acid
Boiling point: 184°—185°C.

Solubility:

Miscible in all proportions with alcohol, ether, ethyl acetate, and other common organic solvents
Only very slightly soluble in water

Derivation:

Esterification of oxalic acid

Method of Purification:

Distillation

Grades:

Technical 96-100% diethyl oxalate

Containers:

Steel or tin-lined drums
Glass bottles

Fire Hazard:

Combustible, but not inflammable, flash point above 80°F.

Railroad Shipping Regulations:

None

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Prices Current and Comment

Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

firm throughout the month. Demand from the rubber industry showed greater acceleration during March, but buying is still being done on a very hand-to-mouth basis.

Carbon Tetrachloride — The demand for this solvent continues undiminished and the bulk of present production moves into consumption immediately. Of the 45,266 pounds (\$1,794) of carbon tetrachloride exported from the United States during January, 1931, 43,275 pounds went to Canada. The latter country also received 81,650 pounds of the 86,721 pounds (\$5,143) of carbon bisulfide exported from the United States in January.

Casein — No sign of any improvement in the price situation was in evidence and the market was generally lower during the month.

Chlorine — An undertone of betterment was indicated when the cylinder price schedule showed decided firmness during the month. In most quarters it was thought that any price change would be upward and that present prices were at their lowest point.

Citrates — Further weakness was in evidence and on March 24th leading producers announced the following prices; representing a general decline of 2c. per lb.

Potassium Citrate U. S. P.

Barrels.....	42½c lb.
100 lb. box.....	43½c lb.
25 lb. box.....	47½c lb.
If 50 lbs.—1c less.....	
5 lb. cans.....	51½c lb.
1 lb. cans.....	54½c lb.
¼ lb. cans.....	70½c lb.
If 25 lbs.—1c less.....	
If 50 lbs.—2c less.....	

Sodium Citrate USP X Gran.

Barrels.....	34½c lb.
100 lb. box.....	35½c lb.
25 lb. box.....	39½c lb.
If 50 lbs.—1c less.....	
5 lb. cans.....	43½c lb.
1 lb. cans.....	46½c lb.
¼ lb. cans.....	62½c lb.
If 25 lbs.—1c less.....	
If 50 lbs.—2c less.....	

Powdered ½c per pound over granular.

Sodium Citrate USP VIII Granular

5c per pound less.

Coal Tar Acids — Anthranilic and benzoic acids were in slightly better demand during March, while picric and salicylic were slow. In all cases no price change was recorded.

Copper — The metal price continued to fluctuate within narrow limits during the month opening at 101¼c and easing off at the close around 93¼-10c. Sales in the domestic market were reported as being rather small. Shipments to foreign ports were in better volume. The statis-

	Current Market	Low	High	1931 High	1930 High	Low	High	1929 Low
Cellosolve (see Ethylene glycol mono ethyl ether).....								
Acetate (see Ethylene glycol mono ethyl ether acetate).....								
Celluloid, Seraps, Ivory cs.....lb.	.13	.15	.13	.15	.20	.20	.30	.20
Shell, cases.....lb.	.18	.20	.18	.20	.20	.18	.20	.18
Transparent, cases.....lb.		.15		.15	.15	.15	.32	.15
Cellulose, Acetate, 50 lb kegs.....lb.	.80	1.25	.80	1.25	1.25	.80	1.25	1.20
Chalk, dropped, 175 lb bbls.....lb.	.03	.03½	.03	.03½	.03½	.03	.03½	.03
Precip, heavy, 560 lb cks.....lb.	.02	.03½	.02	.03½	.03½	.02	.03½	.02
Light, 250 lb casks.....lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½	.02½
Charcoal, Hardwood, lump, bulk wks.....bu.	.18	.19	.18	.19	.19	.18	.19	.18
Willow, powd, 100 lb bbl wks.....lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06
Wood, powd, 100 lb bbls.....lb.	.04	.05	.04	.05	.05	.04	.05	.04
Chestnut, clarified bbls wks.....lb.	.02	.03	.02	.03	.03	.02½	.03	.02½
25% tks wks.....lb.	.01½	.02½	.01½	.02½	.02½	.01½	.02½	.01½
Powd, 60%, 100 lb bgs wks.....lb.	.04½	.04½	.04½	.04½	.04½	.04½	.04½	.04½
Powd, decolorized bgs wks.....lb.	.05½	.06	.05½	.06	.06	.05½	.06	.05½
China Clay, lump, blk mines.....ton	8.00	9.00	8.00	9.00	9.00	8.00	9.00	8.00
Powdered, bbls.....lb.	.01½	.02	.01½	.02	.02	.01½	.02	.01½
Pulverized, bbls wks.....ton	10.00	12.00	10.00	12.00	12.00	10.00	12.00	10.00
Imported, lump, bulk.....ton	15.00	25.00	15.00	25.00	25.00	15.00	25.00	15.00
Powdered, bbls.....lb.	.01½	.03	.01½	.03	.03	.01½	.03½	.01½

Chlorine

Chlorine, cys 10-1 wks contract.....lb.	.07	.08½	.07	.08½	.08½	.07	.08½	.07
cys, cl wks, contract.....lb.	.04	.04½	.04	.04½	.04½	.04	.04½	.04
Liq tank or multi-car lot cys wks contract.....lb.	.01½	.02½	.01½	.02½	.025	.01½	.03	.025
Chlorobenzene, Mono, 100 lb. drs 10-1 wks.....lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.08½
Chloroform, tech, 1000 lb drs.....lb.	.15	.16	.15	.16	.16	.15	.20	.16
Chloropierin, comm cys.....lb.	1.00	1.35	1.00	1.35	1.35	1.00	1.35	1.00
Chrome, Green, CP.....lb.	.26	.29	.26	.29	.29	.26	.29	.26
Commercial.....lb.	.06½	.11	.06½	.11	.11	.06½	.11	.06½
Yellow.....lb.	.16	.18	.16	.18	.18	.16	.18	.15
Chromium, Acetate, 8% Chrome bbls.....lb.	.04½	.05½	.04½	.05½	.05½	.04½	.05½	.04½
20° soln, 400 lb bbls.....lb.	.05½	.05½	.05½	.05½	.05½	.05½	.05½	.05½
Fluoride, powd, 400 lb bbl.....lb.	.27	.28	.27	.28	.28	.27	.28	.27
Oxide, green, bbls.....lb.	.34½	.35½	.34½	.35½	.35½	.34½	.35½	.34½
Coal tar, bbls.....bbl	10.00	10.50	10.00	10.50	10.50	10.00	10.50	10.00
Cobalt Oxide, black, bags.....lb.	2.10	2.22	2.10	2.22	2.22	2.10	2.22	2.10
Cochineal, gray or black bag.....lb.	.52	.57	.52	.57	1.01	.52	1.01	.95
Teneriffe silver, bags.....lb.		.57	.55	.57	.95	.54	.95	.95

Copper

Copper, metal, electrol.....100 lb.	9.75	10.00	9.75	10.36	17.78	9.50	24.00	17.00
Carbonate, 400 lb bbls.....lb.	.08½	.16½	.08½	.16½	.21½	.08½	.25	.13
Chloride, 250 lb bbls.....lb.	.22	.25	.22	.25	.28	.22	.28	.25
Cyanide, 100 lb drs.....lb.	.41	.42	.41	.42	.45	.41	.60	.44
Oxide, red, 100 lb bbls.....lb.	.15½	.18	.15½	.18	.32	.15½	.32	.16½
Sub-acetate verdigris, 400 lb bbls.....lb.	.18	.19	.18	.19	.19	.18	.19	.18
Sulfate, bbls c-1 wks.....100 lb.	4.25	4.95	4.00	4.95	5.50	3.95	7.00	5.50
Coppers, cys and sugar bulk c-1 wks.....ton	13.00	14.00	13.00	14.00	14.00	13.00	14.00	13.00
Cotton, Soluble, wet, 100 lb bbls.....lb.	.40	.42	.40	.42	.42	.40	.42	.40
Cottonseed, S. E. bulk c-1 ton.....	26.50			26.50				
Meal S. E. bulk.....ton	37.50	38.00	37.50	38.00	38.00	37.50	38.00	37.50
7% Amm., bags mill.....ton								
Cream Tartar, USP, 300 lb. bbls.....lb.	.24	.24½	.24	.24½	.27	.24½	.28	.26½
Creosote, USP, 42 lb cys.....lb.	.40	.42	.40	.42	.42	.40	.42	.40½
Oil, Grade 1 tanks.....gal.	.13	.14	.13	.14	.16	.15	.19	.15
Grade 2.....gal.	.11	.12	.11	.12	.14	.13	.23	.13
Grade 3.....gal.	.11	.12	.11	.12	.14	.13	.28	.13
Cresol, USP, drums.....lb.	.13	.17	.13	.17	.17	.14	.17	.14
Crotonaldehyde, 50 gal dr.....lb.	.32	.36	.32	.36	.36	.32	.36	.32
Cudbear, English.....lb.	.16	.17	.16	.17	.17	.16	.17	.16
Cutch, Rangoon, 100 lb bales.....lb.	.11	.13	.11	.13	.13	.11	.16	.12½
Borneo, Solid, 100 lb bale.....lb.	.06½	.08½	.06½	.08½	.08½	.06½	.08½	.08
Cyanamide, bulk c-1 wks.....								
Nitrogen unit.....		1.39		1.39	2.00	1.70	2.00	2.00
Dextrin, corn, 140 lb bags.....100 lb.	3.47	3.67	3.47	4.02	4.82	4.42	4.92	4.62
White, 140 lb bags.....100 lb.	3.42	3.67	3.42	4.02	4.77	4.17	4.87	4.57
Potato, Yellow, 220 lb bgs.....lb.	.08	.09	.08	.09	.09	.08	.09	.08
White, 220 lb bags 10-1.....lb.	.08	.09	.08	.09	.09	.08	.09	.08
Tapioca, 200 lb bags 10-1.....lb.	.08½	.08½	.08½	.08½	.08½	.08	.08½	.08
Diamylphthalate, drs wks.....gal.		3.80		3.80	3.80	3.80	3.80	3.80
Dianisidine, barrels.....lb.	2.35	2.70	2.35	2.70	2.70	2.35	3.10	2.70
Dibutylphthalate, wks.....lb.	.24½	.28	.24½	.28	.28	.24½	.26½	.26½
Dibutyltartrate, 50 gal drs.....lb.	.29½	.31½	.29½	.31½	.31½	.29½	.31½	.29½
Dichloroethylene, 50 gal drs.....lb.		.06		.06	.07	.05	.13	.05
Dichloromethane, drs wks.....lb.	.55	.65	.55	.65	.65	.55	.65	.55
Diethylamine, 400 lb drs.....lb.	2.75	3.00	2.75	3.00	3.00	2.75	3.00	2.75
Diethylcarbonate, drs.....gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Diethylaniline, 850 lb drs.....lb.	.55	.60	.55	.60	.60	.55	.60	.55
Diethyleneglycol, drs.....lb.	.14	.16	.14	.16	.13	.10	.13	.10
Mono ethyl ether, drs.....lb.		.16		.16	.16	.13	.15	.13
Mono butyl ether, drs.....lb.	.24	.30	.24	.30	.30	.24	.30	.25
Diethylene oxide, 50 gal dr.....lb.		.50		.50	.50	.50	.50	.50
Diethylorthotoluidin, drs.....lb.	.64	.67	.64	.67	.67	.64	.67	.64
Diethyl phthalate, 1000 lb drums.....lb.	.24	.26	.24	.26	.26	.24	.26	.24
Diethylsulfate, technical, 50 gal drums.....lb.	.30	.35	.30	.35	.35	.30	.35	.30
Dimethylamine, 400 lb drs.....lb.		2.62		2.62	2.62	2.62	2.62	2.62
Dimethylaniline, 340 lb drs.....lb.	.26	.28	.26	.28	.28	.26	.32	.26

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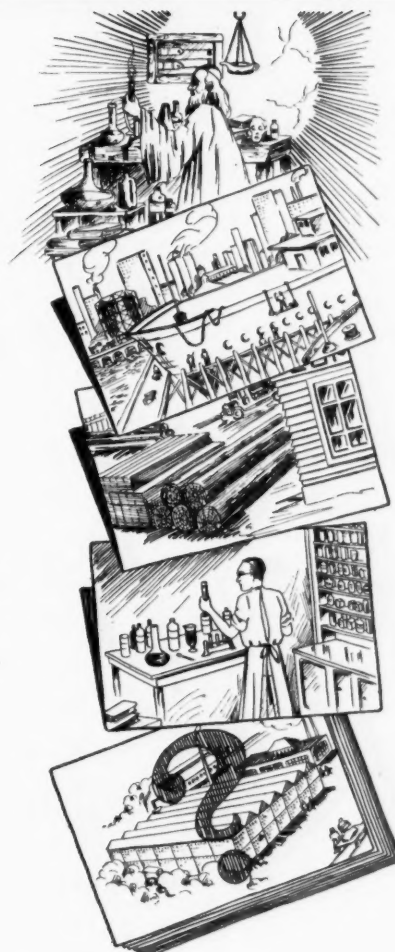
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FINE CHEMICALS



Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

tical position of the metal is expected to show an early improvement as several of the largest consumers were reported as taking rather heavy withdrawals against existing contracts.

Copper Sulfate — The situation in this market continues to be one of the bright spots in the heavy chemical picture. Sales in February, 1930, were larger than for any other February on record. Producers naturally expected a reaction in demand in March but this strangely did not occur. Instead, March figures were quite comparable with the same month in previous years and the outlook for April was considered in a very favorable light by the manufacturers. Evidently the $\frac{1}{4}$ c rise during the mid-winter was felt by the majority of consumers to forecast further strengthening of the price structure and buyers hastened to cover future needs. It is thought, however, that the present price will hold for the immediate future.

Dextrins — The market continued to show signs of fresh weakness as the demand fluctuated widely from day to day. On March 2nd, leading factors announced further reductions that brought the level of white down to \$3.42 and canary down to \$3.47.

Dyes — The rather remarkable rehabilitation of the textile industry has been reflected in the demand and the dye manufacturers have experienced the quickening up that was expected at the first of the year but which failed to materialize mainly because little regard was given to the size of the accumulated stocks. These appear to have been absorbed in many instances. The large increase in dye imports during February over January and the previous February was due to larger shipments of the usual leading colors by Germany, as well as to a wider number of direct dyes, both Swiss and German. Germany's percentage of the February imports was 72.90 against 73.75 during February last year, and Switzerland's share 25 per cent, against 25.05 per cent a year ago. Total imports for the month were 452,477 pounds, against 181,775 pounds during January and 379,102 pounds during February, 1930. Leading dyes, by quantity, imported during February were as follows:

Pounds	
Vat golden yellow GK double paste	62,164
Algol yellow GC	40,180
Vat printing black B paste	17,000
Brilliant wool blue FFR extra	10,503
Brilliant indigo 4B	9,008

Among the direct colors were Benzo fast descriptions; Diamine and Diazo. There were eighteen various Diazo dyes

	Current Market	Low	1931 High	High	1930 Low	High	1929 Low	Low
Dimethylsulfate, 100 lb drs. . . lb.	.45	.50	.45	.50	.45	.50	.40	.45
Dinitrobenzene, 400 lb bbls. . . lb.	.15 $\frac{1}{2}$	.16 $\frac{1}{2}$	.15 $\frac{1}{2}$	.16 $\frac{1}{2}$	.15 $\frac{1}{2}$	.16 $\frac{1}{2}$	.16 $\frac{1}{2}$	.15
Dinitrochlorobenzene, 400 lb bbls. . . lb.	.13	.15	.13	.15	.13	.15	.15	.1
Dinitronaphthalene, 350 lb bbls . lb.	.34	.37	.34	.37	.34	.37	.37	.34
Dinitrophenol, 350 lb bbls. . . lb.	.29	.30	.29	.30	.32	.31	.32	.31
Dinitrotoluene, 300 lb bbls. . . lb.	.16	.17	.16	.17	.18	.16	.19	.17
Diorthotolylguanidine, 275 lb bbls wks. . . lb.	.42	.46	.42	.46	.46	.42	.49	.42
Dioxan (See Diethylene Oxide)								
Diphenyl. . . lb.	.20	.40	.20	.40	.50	.20	.50	.40
Diphenylamine. . . lb.	.37	.38	.37	.38	.40	.38	.47	.40
Diphenylguanidine, 100 lb bbl lb.	.30	.35	.30	.35	.35	.30	.40	.30
Dip Oil, 25%, drum. . . lb.	.26	.30	.26	.30	.30	.26	.30	.26
Divi Divi pods, bgs shipmt. . ton	31.50	35.00	31.50	35.00	46.50	35.00	57.00	46.50
Extract. . . lb.	.05	.05 $\frac{1}{2}$	.05	.05 $\frac{1}{2}$	.05 $\frac{1}{2}$	.05	.05 $\frac{1}{2}$	.05
Egg Yolk, 200 lb cases. . . lb.	.54	.58	.48	.58	.80	.72	.84	.77
Epsom Salt, tech, 300 lb bbls c-1 NY. . . 100 lb.	1.70	1.90	1.70	1.90	1.90	1.70	1.90	1.70
Ether, USP, 600 lb drs. . . lb.	.21	.28	.21	.28	.28	.21	.39	.38
Anhydrous, C.P. 300 lb drs. lb.	.40			.40	.40			
Ethyl Acetate, 85% Ester, tanks. . . lb.	.08	.08		.088	.115	.085	.122	.108
drums. . . lb.	.09	.095	.09	.10	.158	.094	.129	.111
Anhydrous, tanks. . . lb.	.119			.119	.142	.119		
drums. . . lb.	.115	.121	.115	.121	.156	.115		
Acetoacetate, 50 gal drs. . . lb.	.65	.68	.65	.68	.68	.65	.68	.65
Benzylaniline, 300 lb drs. . . lb.	.88	.90	.88	.90	1.11	.88	1.11	1.05
Bromide, tech, drums. . . lb.	.50	.55	.50	.55	.55	.50	.55	.50
Carbonate, 90%, 50 gal drs gal.	1.85	1.90	1.85	1.90	1.90	1.85	1.90	1.85
Chloride, 200 lb. drums. . . lb.	.22	.22	.22	.22	.22	.22	.22	.22
Chloroacetate, cbys. . . lb.	.30	.30	.30	.30	.40	.30	.40	.35
Ether, Absolute, 50 gal drs. lb.	.50	.52	.50	.52	.52	.50	.52	.50
Furoate, 1 lb tins. . . lb.	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Lactate, drums works. . . lb.	.25	.29	.25	.29	.29	.25	.35	.25
Methyl Ketone, 50 gal drs. lb.	.30	.30	.30	.30	.30	.30	.30	.30
Oxalate, drums works. . . lb.	.45	.55	.45	.55	.55	.45	.55	.45
Oxybutyrate, 50 gal drs wks. lb.	.30	.30	.30	.30	.30	.30	.36	.30
Ethylene Dibromide, 60 lb dr. lb.	.70	.70	.70	.70	.70	.70	.70	.70
Chlorhydrin, 40%, 10 gal cbys. chloro. cont. . . lb.	.75	.85	.75	.85	.85	.75	.85	.75
Dichloride, 50 gal drums. . lb.	.05	.07	.05	.07	.07	.05	.10	.05
Glycol, 50 gal drs wks. . . lb.	.25	.28	.25	.28	.28	.25	.30	.25
Mono Butyl Ether drs wks. . lb.	.25	.27	.25	.27	.27	.23	.31	.23
Mono Ethyl Ether drs wks . lb.	.17	.20	.17	.20	.20	.16	.24	.16
Mono Ethyl Ether Acetate dr. wks. . . lb.	.19 $\frac{1}{2}$	.23	.19 $\frac{1}{2}$	.23	.23	.19	.26	.19
Mono Methyl Ether, drs. lb.	.21	.23	.21	.23	.23	.19	.23	.19
Oxide, cyl. . . lb.	2.00			2.00	2.00	2.00		
Ethylidenaniline. . . lb.	.45	.47 $\frac{1}{2}$	.45	.47 $\frac{1}{2}$	.47 $\frac{1}{2}$	.45	.65	.45
Feldspar, bulk. . . ton	15.00	20.00	15.00	20.00	25.00	15.00	25.00	20.00
Powdered, bulk works. . . ton	15.00	21.00	15.00	21.00	21.00	15.00	21.00	15.00
Ferrie Chloride, tech, crystal 475 lb bbls. . . lb.	.05	.07 $\frac{1}{2}$	.05	.07 $\frac{1}{2}$	.07 $\frac{1}{2}$	.05	.09	.05
Fish Scrap, dried, wks. . . unit	4.20 & 10	4.25 & 10	4.20 & 10	4.25 & 10	4.35 & 10	4.30 & 10	4.25 & 10	3.65 & 10
Acid, Bulk 7 & 3 $\frac{1}{2}$ % delivered Norfolk & Balt. basis. . unit	3.50 & 50			3.50 & 50	3.50 & 50	3.20 & 50	4.00 & 50	3.50 & 50
Fluorspar, 98%, bags. . . ton	41.00	46.00	41.00	46.00	46.00	41.00	46.00	41.00

Formaldehyde

Formaldehyde, aniline, 100 lb. drums. . . lb.	.37 $\frac{1}{2}$	.42	.37 $\frac{1}{2}$	.42	.42	.37 $\frac{1}{2}$	.42	.37
USP, 400 lb bbls wks. . . lb.	.06	.07 $\frac{1}{2}$	.06	.07 $\frac{1}{2}$	.08	.06	.10	.08 $\frac{1}{2}$
Fossil Flour. . . lb.	.02 $\frac{1}{2}$	.04	.02 $\frac{1}{2}$	.04	.04	.02 $\frac{1}{2}$	.04	.02 $\frac{1}{2}$
Fullers Earth, bulk, mines. . ton	15.00	20.00	15.00	20.00	20.00	15.00	20.00	15.00 $\frac{1}{2}$
Imp. powd -1 bags. . . ton	24.00	30.00	24.00	30.00	30.00	24.00	30.00	25.00
Furfural (tech.) drums, wks. lb.	.10	.10	.10	.10	.15	.10	.19 $\frac{1}{2}$	.17
Furfural (tech.) 100 lb dr. lb.	.30	.30	.30	.30	.30	.30	.30	.30
Furfuryl Acetate, 1 lb tins. . lb.	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Alcohol, (tech.) 100 lb dr. lb.	.50	.50	.50	.50	.50	.50	.50	.50
Furoic Acid (tech) 100 lb dr. lb.	.50	.50	.50	.50	.50	.50	1.00	.50
Fusel Oil, 10% impurities. . gal.	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Fustic chips. . . lb.	.04	.04	.04	.05	.05	.04	.05	.04
Crystals, 100 lb boxes. . . lb.	.20	.22	.20	.22	.22	.20	.22	.20
Liquid, 50%, 600 lb bbls. . lb.	.09	.10	.09	.10	.10	.09	.10	.09
Solid, 50 lb boxes. . . lb.	.14	.16	.14	.16	.16	.14	.16	.14
Sticks. . . ton	25.00	26.00	25.00	26.00	26.00	25.00	26.00	25.00
G Salt paste, 360 lb bbls. . lb.	.45	.50	.45	.50	.50	.45	.52	.45
Gall Extract. . . lb.	.18	.20	.18	.20	.20	.18	.21	.18
Gambier, common 200 lb ca. . lb.	.06 $\frac{1}{2}$	.07	.06 $\frac{1}{2}$	.07	.07	.06	.07	.06
25% liquid, 450 lb bbls. . lb.	.08	.10	.08	.10	.10	.08	.14	.08
Singapore cubes, 150 lb bg. . lb.	.09 $\frac{1}{2}$	.09	.09 $\frac{1}{2}$	.09	.09	.08 $\frac{1}{2}$	.09	.08 $\frac{1}{2}$
Gelatin, tech, 100 lb cases. . lb.	.45	.50	.45	.50	.50	.45	.50	.45
Glauber's Salt, tech, c-1 wks. . . 100 lb.	1.00	1.70	1.00	1.70	1.70	1.00	1.70	.70
Glucose (grape sugar) dry 70-80° bags c-1 NY. . . 100 lb.	3.24	3.34	3.24	3.34	3.34	3.24	3.34	3.20
Tanner's Special, 100 lb bags . . 100 lb.		3.14		3.14	3.14	3.14	3.14	3.14
Glue, medium white, bbls. . lb.	.22	.24	.22	.24	.24	.20	.24	.20
Pure white, bbls. . . lb.	.25	.26	.25	.26	.26	.22	.26	.22
Glycerin, CP, 550 lb drs. . . lb.	.12 $\frac{1}{2}$	.14 $\frac{1}{2}$	.12 $\frac{1}{2}$	.14 $\frac{1}{2}$	.14 $\frac{1}{2}$	.12 $\frac{1}{2}$	.16	.13 $\frac{1}{2}$
Dynamite, 100 lb drs. . . lb.	.10	.10	.10	.12	.12	.11	.12	.10
Saponification, tanks. . . lb.	.07	.07 $\frac{1}{2}$	.07	.07 $\frac{1}{2}$	.08	.07 $\frac{1}{2}$	.08	.07 $\frac{1}{2}$
Soap Lye, tanks. . . lb.	.06 $\frac{1}{2}$	.07	.06 $\frac{1}{2}$	.07	.07	.06 $\frac{1}{2}$	.07	.06 $\frac{1}{2}$
Graphite, crude, 220 lb bgs. . ton	15.00	35.00	15.00	35.00	35.00	15.00	35.00	15.00
Flake, 500 lb bbls. . . lb.	.06	.09	.06	.09	.09	.06	.09	.06

Gums

Gum Accroides, Red, coarse and fine 140-150 lb bags. . . lb.	.03 $\frac{1}{2}$.04 $\frac{1}{2}$.03 $\frac{1}{2}$.04 $\frac{1}{2}$.04 $\frac{1}{2}$.03 $\frac{1}{2}$.04 $\frac{1}{2}$.03
Powd, 150 lb bags. . . lb.	.06	.06 $\frac{1}{2}$.06	.06 $\frac{1}{2}$.06 $\frac{1}{2}$.06	.06 $\frac{1}{2}$.06 $\frac{1}{2}$

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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

imported during February and recorded by the Tariff Commission. Among vat dyes the Indigosols were prominent, while the list of artificial silk colors featured Cellitons, Cibacete and Setacyl series.

Egg Yolk — The market was generally higher during March.

Formaldehyde — Despite a perceptible lessening in demand for immediate shipments the price structure stood firm.

Glauber's Salt — The slight uneasiness reported in the anhydrous grade in February disappeared and prices were strong in such consuming centers as Paterson, N. J.

Glycerine — The unfavorable aspects of the market continued to outweigh the favorable ones. The anti-freeze business was off again in March and the entire year's total is considerably below last year, due to the mild weather conditions existing in most parts of the country and also due to the competition from other chemicals in the anti-freeze market. At the beginning of the month, dynamite grade touched 10¼¢ and soap lye 6¼¢. As the month closed dynamite went to 10c.

Gums — Little improvement appears to have been made towards stabilization of prices in most of the gums. Arabic was a special target during the most of the month, white sorts went to 28c from 33c, amber sorts from 10½¢ to 10c. Some of the other reductions were Asafetida down to 19c for the lump and 33c for the powdered, Benzoin (Sumatra) down to 31c, mastic down to 48c. In fact the entire list was off again in March from the February levels. Further, the general tone appears to be without any likelihood of immediate improvement, although some improvement has again been made in lowering surplus stocks. Singapore, which was formerly an important port for the collection and distribution of gum damar, has been falling off in export shipments. It is estimated that about 80 per cent of the gum shipped from Singapore constitutes importations from Siam, British Borneo, and Netherland East Indies. Exports from Singapore during 1930 aggregated 1,160,330 pounds, valued at \$217,399 as against 4,900,755 pounds, valued at \$712,892 for 1929. Concurrent with the large decrease in volume was a decided reduction in price of the commodity.

Intermediates — Shipments were somewhat disappointing of most of the intermediates, although equal to last month. Conditions showed decided improvement in the phthalic anhydride market, both in the volume moving out into consuming channels and also in the firmness of the price structure.

	Current Market	Low	1931 High	High	1930 Low	High	1929 Low
Yellow, 150-200 lb bags...lb.	18	.20	.18	.20	.20	.18	.20
Animi (Zanzibar) bean & pea 250 lb cases.....lb.	.35	.40	.35	.40	.35	.40	.35
Glassy, 250 lb cases.....lb.	.50	.55	.50	.55	.50	.55	.50
Asphaltum, Barbadoes (Manjak) 200 lb bags.....lb.	.09	.12	.09	.12	.09	.12	.09
Egyptian, 200 lb cases.....lb.	.15	.17	.15	.17	.15	.17	.15
Gilsonite Selects, 200 lb bags cases.....ton	58.00	65.00	58.00	65.00	65.00	58.00	65.00
Damar Batavia standard 136, lb cases.....lb.	.11½	.12	.11½	.13	.20	.14	.26
Batavia Dust, 160 lb bags.....lb.	.05½	.06	.05½	.06	.11	.06	.11
E Seeds, 136 lb cases.....lb.	.07	.07½	.07	.08	.13	.08	.17½
F Splinters, 136 lb cases and bags.....lb.	.06½	.07	.06½	.07½	.13½	.07	.13½
Singapore, No 1, 224 lb cases lb.	.13½	.14	.13	.15	.24	.18½	.30½
No. 2, 224 lb cases.....lb.	.08½	.09	.08½	.10	.20½	.13	.24
No. 3, 180 lb bags.....lb.	.05	.05½	.05	.06	.11½	.07	.14
Benzoin Sumatra, U. S. P. 120 lb cases.....lb.	.31	.33	.31	.34	.40	.33	.40
Copal Congo, 112 lb bags, clean opaque.....lb.	.16½	.17	.16	.17	.16	.17	.14
Dark, amber.....lb.	.06	.07	.06½	.07½	.08	.07½	.09
Light, amber.....lb.	.12½	.14	.12½	.14	.14	.12½	.14
Water white.....lb.	.37	.45	.37	.45	.37	.36	.35
Mastic.....lb.	.48	.52	.48	.58	.65	.57	.65
Manila, 180-190 lb baskets							
Loba A.....lb.	.11	.12	.11	.13	.17½	.13	.17½
Loba B.....lb.	.09	.09½	.09	.10½	.16½	.13½	.16½
Loba C.....lb.	.08½	.09	.08½	.10	.14	.10	.14½
M A Sorts.....lb.	.05½	.06	.05½	.06½	.....	.....	.....
D B B Chips.....lb.	.07	.07½	.07	.08	.....	.....	.....
East Indies chips, 180 lb bags lb.	.05	.05½	.05	.05½	.11	.09	.11
Pale bold, 224 lb cs.....lb.	.15½	.16	.15½	.16	.21	.17½	.21
Pale nubs, 180 lb bags.....lb.	.08	.08½	.08	.09	.16	.12½	.16
Pontianak, 224 lb cases.....lb.	.16	.17	.16	.17	.21	.19	.23
Bold gen No 1.....lb.	.07	.08	.07	.08½	.15	.13½	.15
Gen chips spot.....lb.	.10	.10½	.10	.12	.14	.12½	.14
Elemi, No. 1, 80-85 lb cs.....lb.	.09½	.10	.09½	.11½	.13½	.12	.13½
No. 2, 80-85 lb cases.....lb.	.08½	.09½	.08½	.11	.13	.11	.13
No. 3, 80-85 lb cases.....lb.	.43	.49	.43	.50	.57	.48	.57
Kauri, 224-226 lb cases No. 1	.26	.27	.26	.29	.38	.32	.38
No. 2 fair pale.....lb.	.10	.12	.10	.12	.12	.10	.12
Brown Chips, 224-226 lb cases.....lb.	.28	.30	.28	.34	.40	.38	.40
Bush Chips, 224-226 lb cases.....lb.	.19	.21	.19	.22	.26	.24½	.26
Pale Chips, 224-226 lb cases.....lb.	.18	.20	.18	.22	.40	.27	.72
Sandarac, prime quality, 200 lb bags & 300 lb casks.....lb.	25.00	.....	.....	25.00	25.00	25.00	20
Helium, 1 lit. bot.....lit.	.14	.18	.14	.18	.18	.14	.20
Hematine crystals, 400 lb bbls lb.	.....	.11	.....	.11	.11	.11	.11
Paste, 500 bbls.....lb.	.03	.03½	.03	.03½	.03½	.03	.03½
Hemlock 25%, 600 lb bbls wks lb.	.....	16.00	.....	16.00	16.00	16.00	17.00
Bark.....ton	.....	.....	.....	.....	.....	.....	16.00
Hexalene, 50 gal drs wks.....lb.	.....	.60	.....	.60	.60	.60	.60
Hexamethylenetetramine, drs lb.	.46	.50	.46	.50	.50	.46	.58
Hoof Meal, fob Chicago.....unit	2.50	.....	2.50	3.75	2.50	4.00	3.75
South Amer. to arrive.....unit	2.70	.....	2.70	3.75	2.70	3.90	3.75
Hydrogen Peroxide, 100 vol, 140 lb cbsys.....lb.	.21	.24	.21	.24	.26	.21	.26
Hydroxamine Hydrochloride lb.	.....	3.15	.....	3.15	3.15	.....	.....
Hypernic, 51%, 600 lb bbls.....lb.	.12	.15	.12	.15	.15	.12	.15
Indigo Madras, bbls.....lb.	1.28	1.30	1.28	1.30	1.30	1.28	1.28
20% paste, drums.....lb.	.15	.18	.15	.18	.18	.15	.18
Synthetic, liquid.....lb.	.....	.12	.....	.12	.12	.12	.12
Iron Chloride, see Ferric or Ferrous							
Iron Nitrate, kegs.....lb.	.09	.10	.09	.10	.10	.09	.10
Coml, bbls.....100 lb.	2.50	3.25	2.50	3.25	3.25	2.50	3.25
Oxide, English.....lb.	.10	.12	.10	.12	.12	.10	.12
Red, Spanish.....lb.	.02½	.03½	.02½	.03½	.03½	.02½	.03½
Isopropyl Acetate, 50 gal drs gal.	.85	.90	.85	.90	.90	.85	.90
Japan Wax, 224 lb cases.....lb.	.09½	.10	.09½	.11	.15½	.11½	.18
Kieselguhr, 95 lb bgs NY.....ton	60.00	70.00	60.00	70.00	70.00	60.00	70.00
Lead Acetate, bbls wks.....100 lb.	10.50	11.00	10.50	11.00	13.50	10.50	13.50
White crystals, 500 lb bbls wks.....100 lb.	11.50	12.00	11.50	12.25	14.50	11.50	14.50
Arsenate, drs 1c-1 wks.....lb.	.11	.13	.11	.14	.16	.13	.15
Dithiofuroate, 100 lb dr.....lb.	.....	1.00	.....	1.00	1.00	1.00	.....
Metal, c-1 NY.....100 lb.	4.50	4.60	4.25	4.60	7.75	5.10	7.75
Nitrate, 500 lb bbls wks.....lb.	.13	.14	.13	.14	.14	.13	.14
Oleate, bbls.....lb.	.17½	.18	.17	.18	.18	.17	.18
Oxide Litharge, 500 lb bbls lb.	.07	.08	.07	.08	.08	.08	.08
Red, 500 lb bbls wks.....lb.	.07	.08	.07	.08	.09	.08	.09
White, 500 lb bbls wks.....lb.	.07	.08	.07	.08	.09	.07	.09
Sulfate, 500 lb bbls wk.....lb.	.06½	.07	.06½	.07	.08	.06½	.08
Leuna saltpetre, bags c.i.f.....ton	.....	57.60	.....	57.60	57.60	57.60	57.00
S. points c. i. f.....ton	.....	57.90	.....	57.90	57.90	57.30	52.30
Lime, ground stone bags.....ton	.....	4.50	.....	4.50	4.50	4.50	4.50
Live, 325 lb bbls wks.....100 lb.	.....	1.05	.....	1.05	1.05	1.05	1.05
Lime Salts, see Calcium Salts							
Lime-Sulfur soln bbls.....gal.	.15	.17	.15	.17	.17	.15	.17
Lithopone, 400 lb bbls 1c-1 wks.....lb.	.04½	.05	.04½	.05	.05½	.04½	.06½
Logwood, 51%, 600 lb bbls.....lb.	.07	.08	.07	.08	.08	.07	.08
Chips, 150 lb bags.....lb.	.03	.03½	.03	.03½	.03	.03	.03
Solid, 50 lb boxes.....lb.	.12	.12½	.12	.12½	.12½	.12	.12½
Sticks.....ton	24.00	26.00	24.00	26.00	26.00	24.00	26.00
Lower grades.....lb.	.07½	.08	.07½	.08	.08	.07½	.08
Madder, Dutch.....lb.	.22	.25	.22	.25	.25	.22	.25
Magnesite, calc, 500 lb bbl.....ton	50.00	60.00	50.00	60.00	60.00	50.00	60.00

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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

Lead — The metal was somewhat weaker during the month in the face of a decreased demand from consuming centers. The price of \$4.50 spot N. Y. (March 26) was 15c under the ruling quotation at the end of last month. Some thought is being given to a curtailment diagram of 15 to 20%, but to date nothing definite has been decided upon by the leading factors.

Lead Arsenate — Effective March 16, a reduction of 2c a lb. was announced and the present level of prices is based on 11c. Following this reduction some improvement in inquiry and sales was noted by several factors and the drop in price was said to have accomplished its purpose of starting active buying for the season.

Methanol — With interest centered mainly on alcohol, producers of both the natural and the synthetic were marking time preferring to sit by for the moment and await developments. That the break in alcohol prices will affect the methanol situation is, of course, taken for granted but at the moment the situation is filled with uncertainty. The price structure remained unchanged.

Nickel Salt — The plating industry is very definitely on the upgrade and sales of both the single and double salt reflect returning confidence. Accessory manufacturers were taking shipments against existing contracts in better volume than at any time in the last four or five months. The prices were firm and unchanged.

Phenol — Actual sales and shipments in March were considerably better last month. Prices remained unchanged.

Potash Caustic — The firm position of this commodity remained unchanged during the month. Both domestic and imported were moving in fair volume.

Quicksilver — Further reductions appeared unlikely as the market touched \$101. Some sales were reported to have been made at \$100, but these could not be confirmed and it is said that importers and producers are unwilling to make any new concessions.

Rosin — Prices closed in March at much higher levels than those prevailing at the opening of the month. Demand continued to show improvement both in the domestic market and also abroad. Shipments to Europe from Southern ports were larger in March than in some time. Buyers however, were not showing any undue haste to cover future requirements and sales were generally in moderate size for immediate shipment. This favorable picture is somewhat dampened when comparison is had with last year's statistics. Total exports for February amounted to \$601,433, against \$1,563,717, a drop of

	Current Market	Low	High	1931 Low	High	1930 Low	High	1929 Low	High
Magnesium									
Magnesium Carb, tech, 70 lb bags NY.....lb.	.06	.06½	.06	.06½	.06½	.06	.06½	.06	.06
Chloride flake, 375 lb. drs c-1 wks.....ton	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Imported shipment.....ton	31.75	33.00	31.75	33.00	33.00	31.75	33.00	33.00	33.00
Fused, imp, 900 lb bbls NY ton	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00	31.00
Fluosilicate, crys, 400 lb bbls wks.....lb.	.10	.10½	.10	.10½	.10½	.10	.10½	.10	.10
Oxide, USP, light, 100 lb bbls.....lb.	.42	.42	.42	.42	.42	.42	.42	.42	.42
Heavy, 250 lb bbls.....lb.	.50	.50	.50	.50	.50	.50	.50	.50	.50
Peroxide, 100 lb cs.....lb.	1.00	1.25	1.00	1.25	1.25	1.00	1.25	1.00	1.00
Silicofluoride, bbls.....lb.	.09½	.10½	.09½	.10½	.10½	.09½	.10½	.09½	.09½
Stearate, bbls.....lb.	.24	.26	.24	.26	.26	.25	.26	.25	.25
Manganese Borate, 30%, 200 lb bbls.....lb.	.19	.19	.19	.19	.19	.19	.24	.19	.19
Chloride, 600 lb casks.....lb.	.07½	.08½	.07½	.08½	.08½	.07½	.08½	.07½	.08
Dioxide, tech (peroxide) drs lb.	.03½	.06	.03½	.06	.06	.03½	.06	.04½	.04½
Ore, Powdered or granular.....lb.	.02½	.03	.02½	.03	.03	.02½	.03½	.02½	.02½
75-80%, bbls.....lb.	.03½	.03½	.03½	.03½	.03½	.03½	.04½	.03½	.03½
80-85%, bbls.....lb.	.04	.04½	.04	.04½	.04½	.04	.05½	.04	.04
85-88%, bbls.....lb.	.07	.08	.07	.08	.08	.07	.08½	.07	.07
Sulfate, 550 lb drs NY.....lb.	.03½	Nom.	.03½	Nom.	Nom.	.03½	Nom.	.03½	.03½
Mangrove 55%, 400 lb bbls.....lb.	28.00	29.75	28.00	29.75	33.00	29.75	35.00	30.00	30.00
Bark, African.....ton	14.00	15.00	14.00	15.00	15.00	14.00	15.00	14.00	14.00
Marble Flour, bulk.....ton	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Mercurous chloride.....lb.	101.00	102.00	101.00	106.00	124.50	106.00	128.00	120.00	120.00
Mercury metal.....76 lb flask	.67	.69	.67	.69	.69	.67	.74	.67	.67
Meta-nitro-aniline.....lb.	1.50	1.55	1.50	1.55	1.55	1.50	1.55	1.50	1.50
Meta-nitro-para-toluidine 200 lb. bbls.....lb.	.80	.84	.80	.84	.84	.80	.90	.80	.80
Meta-phenylene-diamine 300 lb. bbls.....lb.	.67	.69	.67	.69	.69	.67	.72	.67	.67
Meta-toluene-diamine, 300 lb. bbls.....lb.									
Methanol									
Methanol, (Wood Alcohol).....gal.	.35	.37	.35	.37	.48	.35	.65	.51	.51
97%.....gal.	.39	.43	.39	.43	.49	.39	.65	.53	.53
Pure, Synthetic drums cars gal.	.42½	.42½	.42½	.42½	.50	.42½	.68	.53	.53
Synthetic tanks.....gal.	.40½	.40½	.40½	.40½	.50	.40½	.66	.54	.54
Methyl Acetate, drums.....gal.	Nom.	Nom.	Nom.	Nom.	Nom.	Nom.	.95	.95	.95
Acetone.....gal.	.62	.70	.62	.70	.77	.65	.85	.73	.73
Anthraquinone.....lb.	.85	.95	.85	.95	.85	.70	.95	.85	.85
Cellosolve, (See Ethylene Glycol Mono Methyl Ether).....lb.	.45	.45	.45	.45	.45	.45	.60	.45	.45
Chloride, 90 lb cyl.....lb.	.50	.50	.50	.50	.50	.50	.50	.50	.50
Furoate, tech, 50 gal. dr., lb.	65.00	80.00	65.00	80.00	80.00	65.00	80.00	65.00	65.00
Mica, dry grd. bags wks.....lb.	110.00	115.00	110.00	115.00	115.00	110.00	115.00	110.00	110.00
Wet, ground, bags wks.....lb.	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Michler's Ketone, kegs.....lb.									
Monochlorobenzene, drums see, Chlorobenzene, mono.....lb.									
Monomethylparaminosulfate 100 lb drums.....lb.	3.75	4.00	3.75	4.00	4.00	3.75	4.20	3.75	3.75
Montan Wax, crude, bags.....lb.	.06	.07	.06	.07	.07	.06	.07	.06½	.06½
Myrobalans 25%, liq bbls.....b	.03½	.04½	.03½	.04½	.04½	.03½	.04½	.03½	.03½
50% Solid, 50 lb boxes.....lb.	.05	.05½	.05	.05½	.05½	.05	.08½	.05	.05
J1 bags.....ton	34.00	35.00	34.00	35.00	41.00	34.00	43.00	40.00	40.00
J2 bags.....ton	19.50	20.00	19.00	22.50	26.50	19.75	40.00	26.50	26.50
R2 bags.....ton	18.25	20.00	18.75	20.00	27.50	19.00	34.00	27.50	27.50
Naphtha, v. m. & p. (deodorized) bbls.....gal.	.17	.18	.17	.18	.16	.16	.18	.16	.16
Naphthalene ballc, 250 lb bbls wks.....lb.	.03½	.04½	.03½	.04½	.05½	.03½	.05½	.05½	.05½
Crushed, chipped bgs wks.....lb.	.04	.04	.04	.04	.04	.04	.04	.04	.04
Flakes, 175 lb bbls wks.....lb.	.03½	.03½	.03½	.05½	.05	.03½	.05	.05	.05
Nickel Chloride, bbls kegs.....lb.	.18	.20	.18	.21	.21	.20	.24	.20	.20
Oxide, 100 lb kegs NY.....lb.	.37	.40	.37	.40	.40	.37	.40	.37	.37
Salt bbl, 400 bbls lb NY.....lb.	.10½	.13	.10½	.13	.13	.10½	.13	.13	.13
Single, 400 lb bbls NY.....lb.	.10½	.12	.10½	.12	.13	.10½	.13	.13	.13
Metal ingot.....lb.	.35	.35	.35						
Nicotine, free 40%, 8 lb tins, cases.....lb.	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25	1.25
Sulfate, 10 lb tins.....lb.	.98½	1.20	.98½	1.20	1.20	.98½	1.20	.98½	.98½
Nitze Cake, bulk.....ton	12.00	14.00	12.00	14.00	18.00	12.00	18.00	12.00	12.00
Nitrobenzene, redistilled, 1000 lb drs wks.....lb.	.09	.09½	.09	.09½	.09½	.09	.10½	.09	.09
Nitrocellulose, c-l-l-cl, wks.....lb.	.25	.36	.25	.36	.36	.25	.36	.25	.25
Nitrogenous Material, bulk, unit	2.40	2.50	2.40	2.70	3.40	2.50	4.00	3.40	3.40
Nitronaphthalene, 550 lb bbls lb.	.25	.25	.25	.25	.25	.25	.25	.25	.25
Nitrotoluene, 1000 lb drs wks lb.	.14	.15	.14	.15	.15	.14	.15	.14	.14
Nutgalls Aleppy, bags.....lb.	.16	.16½	.16	.16½	.16½	.16	.16½	.16	.16
Chinese, bags.....lb.	.12	.13	.12	.13	.13	.12	.13	.12	.12
Oak Bark, ground.....ton	30.00	35.00	30.00	35.00	35.00	30.00	50.00	30.00	30.00
Whole.....ton	20.00	23.00	20.00	23.00	23.00	20.00	23.00	20.00	20.00
Orange-Mineral, 1100 lb casks NY.....lb.	.11½	.13	.11½	.13	.13	.11½	.13½	.11½	.11½
Orthoaminophenol, 50 lb kgs.....lb.	2.15	2.25	2.15	2.25	2.25	2.15	2.25	2.15	2.15
Orthoanisidine, 100 lb drs.....lb.	2.50	2.60	2.50	2.60	2.60	2.50	2.60	2.50	2.50
Orthochlorophenol, drums.....lb.	.25	.65	.25	.65	.65	.25	.65	.25	.25
Orthocresol, drums.....lb.	.25	.25	.25	.25	.35	.18	.28	.18	.18
Orthodichlorobenzene, 1000 lb drums.....lb.	.07	.10	.07	.10	.10	.07	.10	.07	.07
Orthonitrochlorobenzene, 1200 lb drs wks.....lb.	.30	.33	.30	.33	.33	.30	.33	.30	.30
Orthonitrotoluene, 1000 lb drs wk.....lb.	.16	.18	.16	.18	.18	.16	.18	.16	.16
Orthonitrophenol, 350 lb dr.....lb.	.85	.90	.85	.90	.90	.85	.90	.85	.85
Orthotoluidine, 350 lb bbl 1e-1 lb.	.28	.30	.25	.30	.30	.25	.30	.25	.25

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Purchasing Power of the Dollar: 1926 Average—\$1.00 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

almost \$1,000,000. They were also more than \$600,000 under January, 1931. Gum rosin shipments to foreign ports fell from 53,345 barrels to 36,404 with respective values of \$733,887 and \$310,953. Gum turpentine dropped from 662,026 to 298,345 gallons valued at \$367,638 and \$133,238, respectively. The wood products also suffered severely. Wood rosin exports declined from 16,951 barrels valued at \$230,058 to 7,791 worth \$72,025. Steam distilled turpentine decreased from 49,236 gallons with a value of \$25,347 to 33,439 worth \$13,246. Other gums and rosins showed a decline from \$189,702 to \$63,988. For the first two months of the year the total exports of naval stores slumped to \$1,840,331, as against \$3,521,411 for the same period in 1930.

Saltcake — Due to the continued restricted activity in the paper industry saltcake prices were rather soft and some slight concessions were offered to move material into consumers' hands.

Shellac — The rise in the shellac market was somewhat spectacular in nature and for several days caused quite a flurry. This spurt could not be maintained, however, and the market tired near the close of the month and prices were off from the high, but still considerably above the range for February. Actual sales were in much better volume and stocks consequently are lower. The future trend of the market is somewhat in doubt, but the general consensus of opinion was that a further slight price improvement might occur but that the movement in any case would be within a very narrow range. Shellac shipments from Calcutta during February amounted to 22,600 packages, according to John R. Anderson & Co., as reported by the *Journal of Commerce* compared with 30,500 packages during the same month last year and 31,500 packages two years ago. Exports to the United States for the month were 7,200 packages, against 11,500 last year and 17,700 two years ago; of this amount, orange totaled 4,300 packages; garnet, 100, and seedlac, 2,800 packages. Shipments to the United Kingdom were 8,000 packages, against 13,400 last year and 9,000 packages two years ago. To the Continent, 7,400 packages, against 5,600 last year and 4,700 two years ago. Shellac shipments from Calcutta during the first half of March amounted to 11,300 packages. Of this quantity 4,300 packages were shipped to America, 6,000 to the United Kingdom and 1,000 to the Continent. Of the United States shipments, 3,300 packages were orange shellac and 1,000 seedlac. During the same time last year total shipments were 19,200 packages and for the corresponding period two years ago 16,400


	Current Market	Low	1931 High	High	1930 Low	High	1929 Low	High
Orthonitroparachlorphenol, tins								
.....lb.	.70	.75	.70	.75	.70	.75	.70	.75
Osage Orange, crystals.....lb.	.16	.17	.16	.17	.16	.17	.16	.17
51 deg. liquid.....lb.	.07	.07	.07	.07	.07	.07	.07	.07
Powdered, 100 lb bags.....lb.	.14	.15	.14	.15	.14	.15	.14	.15
Paraffin, retd, 200 lb cs slabs								
123-127 deg. M. P.....lb.	.03	.03	.03	.03	.04	.03	.06	.04
128-132 deg. M. P.....lb.	.03	.03	.03	.03	.06	.03	.07	.04
133-137 deg. M. P.....lb.	.04	.07	.04	.07	.07	.04	.07	.06
Para Aldehyde, 110-55 gal drs.....lb.	.20	.23	.20	.23	.23	.20	.28	.20
Aminoacetanilid, 100 lb bg.....lb.	.52	.60	.52	.60	1.05	.52	1.05	1.00
Aminohydrochloride, 100 lb kegs.....lb.	1.25	1.30	1.25	1.30	1.30	1.25	1.30	1.25
Aminophenol, 100 lb keg.....lb.	.84	.86	.84	.86	1.02	.92	1.15	.99
Chlorophenol, drums.....lb.	.50	.65	.50	.65	.65	.50	.65	.50
Coumarone, 330 lb drums.....lb.	2.25	2.50	2.25	2.50	2.50	2.25	2.50	2.25
Cymene, retd, 110 gal dr.....gal.								
Dichlorobenzene, 150 lb bbls.....lb.	.17	.20	.17	.20	.20	.17	.20	.17
Nitroacetanilid, 300 lb bbls.....lb.	.50	.55	.50	.55	.55	.50	.55	.50
Nitroaniline, 300 lb bbls.....lb.	.48	.55	.48	.55	.55	.48	.55	.48
Nitrochlorobenzene, 1200 lb drs.....lb.	.23	.26	.23	.26	.26	.23	.26	.23
Nitro-orthotoluidine, 300 lb bbls.....lb.	2.75	2.85	2.75	2.85	2.85	2.75	2.85	2.75
Nitrophenol 185 lb bbls.....lb.	.45	.50	.45	.50	.50	.45	.55	.45
Nitrosodimethylaniline, 120 lb bbls.....lb.	.92	.94	.92	.94	.94	.92	.94	.92
Nitrotoluene, 350 lb bbls.....lb.	.29	.31	.29	.31	.31	.29	.31	.29
Phenylenediamine, 350 lb bbls.....lb.	1.15	1.20	1.15	1.20	1.20	1.15	1.20	1.15
Tolueneulfonamide, 175 lb bbls.....lb.	.70	.75	.70	.75	.75	.70	.75	.70
Tolueneulfonchloride, 410 lb bbls.....lb.	.20	.22	.20	.22	.22	.20	.22	.20
Toluidine, 350 lb bbls.....lb.	.44	.44	.44	.44	.40	.38	.42	.38
Paris Green, Arsenio Basis 100 lb kegs.....lb.	.27	.27	.27	.27	.27	.27	.27	.27
250 lb kegs.....lb.	.25	.25	.25	.25	.25	.25	.25	.25
Persian Berry Ext., bbls.....lb.	.25	Nom.	.25	Nom.	Nom.	.25	.25	.25
Pentanol (see Alcohol, Amyl).....lb.								
Pentanol Acetate (see Amyl Acetate).....lb.								
Petrolatum, Green, 300 lb bbl.....lb.	.02	.02	.02	.02	.02	.02	.02	.02
Phenol, 250-100 lb drums.....lb.	.14	.15	.14	.15	.15	.14	.16	.13
Phenyl - Alpha - Naphthylamine, 100 lb kegs.....lb.	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Phenylhydrazine Hydrochloride.....lb.	2.90	3.00	2.90	3.00	3.00	2.90		

Phosphate

Phosphate Acid (see Superphosphate)								
Phosphate Rock, f.o.b. mines								
Florida Pebble, 68% basis.....ton	3.10	3.25	3.10	3.25	3.15	3.00	3.15	3.00
70% basis.....ton	3.75	3.90	3.75	3.90	4.00	3.75	4.00	3.50
72% basis.....ton	4.25	4.35	4.25	4.35	4.50	4.25	4.50	4.00
75-74% basis.....ton	5.25	5.50	5.25	5.50	5.50	5.25	5.50	5.00
75% basis.....ton	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75
77-80% basis.....ton	6.25	6.25	6.25	6.25	6.25	6.25	6.25	6.25
Tennessee, 72% basis.....ton	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Phosphorous Oxide 175 lb cyl.....lb.	.18	.20	.18	.20	.25	.18	.40	.20
Red, 110 lb cases.....lb.	.37	.42	.37	.42	.42	.37	.60	.37
Yellow, 110 lb cases.....lb.	.31	.37	.31	.37	.37	.31	.32	.31
Sesquisulfide, 100 lb cs.....lb.	.44	.44	.44	.44	.44	.44	.46	.44
Trichloride, cylinders.....lb.	.18	.20	.18	.20	.25	.18	.35	.20
Phthalic Anhydride, 100 lb bbls.....lb.	.15	.16	.15	.16	.20	.15	.20	.18
Pigments Metallic, Red or brown bags, bbls, Pa. wks.....ton	37.00	45.00	37.00	45.00	45.00	37.00	45.00	37.00
Pine Oil, 55 gal drums or bbls								
Destructive dist.....lb.	.63	.64	.63	.64	.64	.63	.64	.63
Prime bbls.....bbl.	8.00	10.60	8.00	10.60	10.60	8.00	10.60	8.00
Steam dist. bbls.....gal.	.65	.70	.65	.70	.70	.65	.70	.65
Pitch Hardwood.....ton	35.00	45.00	35.00	45.00	45.00	35.00	45.00	40.00
Plaster Paris, tech, 250 lb bbls.....bbl.	3.30	3.50	3.30	3.50	3.50	3.30	3.50	3.30
Platinum, Refined.....oz.	27.00	28.00	27.00	28.00				

Potash

Potash, Caustic, wks, solid.....lb.	.06	.06	.06	.06	.06	.06	.07	.06
flake.....lb.	.0705	.08	.0705	.08	.08	.0705	.07	.0705
Potash Salts, Rough Kainit								
12.4% basis bulk.....ton	9.20	9.20	9.20	9.20	9.10	9.10	9.10	9.00
14% basis.....ton	9.70	9.70	9.70	9.70	9.60	9.60	9.60	9.50
Manure Salts.....ton								
20% basis bulk.....ton	12.65	12.65	12.65	12.65	12.50	12.50	12.50	12.40
30% basis bulk.....ton	19.15	19.15	19.15	19.15	18.95	18.95	18.95	18.75
Potassium Acetate.....lb.	.28	.30	.28	.30	.30	.27		
Potassium Muriate, 80% basis bags.....ton	37.15	37.15	37.15	37.15	36.75	36.75	36.40	
Pot. & Mag. Sulfate, 45% basis bags.....ton	27.80	27.80	27.80	27.80	27.50	27.50	27.00	
Potassium Sulfate, 90% basis bags.....ton	48.25	48.25	48.25	48.25	47.75	47.75	47.30	
Potassium Bicarbonate, USP, 320 lb bbls.....lb.	.09	.10	.09	.10	.10	.09	.14	.09
Bichromate Crystals, 725 lb casks.....lb.	.08	.09	.08	.09	.09	.08	.09	.09
Powd., 725 lb cks wks.....lb.	.13	.13	.13	.13	.13	.13	.13	.13



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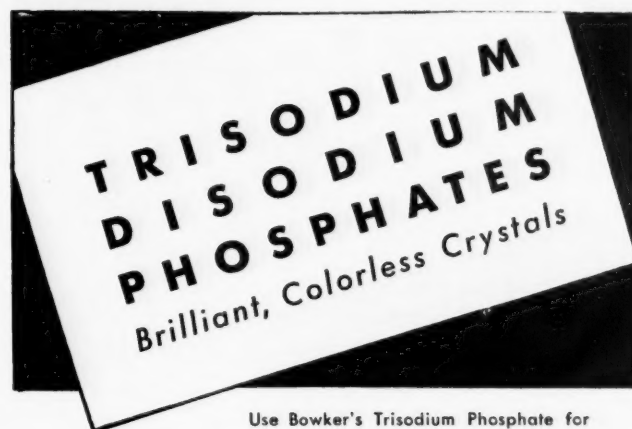
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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

packages. Of last year's shipments America received 7,500 and of those two years ago 9,500 packages.

Soda Ash—The excitement of the contract season appeared to have run its course and the alkali market was dull and lifeless. Shipments into consuming channels have increased in encouraging volume each month of the present year. Spot sales were fair and the new less carlot schedule was being adhered to rather firmly.

Sodium Bichromate—The total volume of shipments was reported to have been in better during March. Withdrawals by dry color producers were larger, while the textile industry, and the leather industry to a lesser degree, were both more active. Prices were unchanged at 7c-7½c.

Soda Caustic—The soap industry has been one of the most encouraging signs to alkali producers and shipments into this industry are very close to normal. On the other hand, demand from the petroleum industry has been off due to the lowered schedules in effect. Spot prices were generally firmer.

Sodium Silicofluoride—The price tendency in this commodity was upward although sales were made at the 4c figure. Indications pointed to the strong possibility of an increase of ½c.

Starch—The market specially during the last half of the month held firm despite the further continuance of hand to mouth buying.

Superphosphate—Underlying conditions have not changed in the market for this commodity in some time. Shipments continue to reflect the unsatisfactory conditions under which the fertilizer industry is laboring and the large stocks are proving a stumbling block to creating any improvement in the price situation. Tunisia ranks second to the United States as a world producer of phosphate rock and leads the world as an exporter. Exports in 1930 of 2,600,000 tons show a loss of 400,000 tons from the 1929 total of 3,018,000. Notwithstanding, production totaled 3,200,000 tons, as compared with 2,500,000 tons in 1929. The excellent export record of 1929 cleared accumulated stocks, but the failure to regulate the output to demand in 1930 has led to accumulation of new stocks.

Tankage—Underground lack of demand coupled with increased stocks forced producers to radical reductions during the month, the loss amounting to 20c, from \$2.50 to \$2.30. The market for the ground was also lower.

	Current Market	Low	1931 High	1930 High	Low	1929 High	Low
Binoxiate, 300 lb bbls.....lb.	.14	.17	.14	.17	.17	.14	.14
Bisulfate, 100 lb kegs.....lb.	.30	.30	.30	.30	.30	.30	.30
Carbonate, 80-85% calc. 800 lb casks.....lb.	.05½	.05½	.05½	.05½	.05½	.05½	.05½
Chlorate crystals, powder 112 lb keg wks.....lb.	.08	.08½	.08	.08½	.09	.08	.08½
Chloride, crys bbls.....lb.	.05½	.06	.05½	.06	.06	.05½	.05½
Chromate, kegs.....lb.	.23	.28	.23	.28	.28	.23	.23
Cyanide, 110 lb cases.....lb.	.55	.57½	.55	.57½	.57½	.55	.55
Metabisulfate, 300 lb bbl.....lb.	.12	.13	.12	.13	.13	.12	.11
Oxalate, bbls.....lb.	.20	.24	.20	.24	.24	.20	.16
Perchlorate, casks wks.....lb.	.11	.12	.11	.12	.12	.11	.11
Permanganate, USP, crys 500 & 100 lb drs wks.....lb.	.16	.16½	.16	.16½	.16	.16½	.16
Prussiate, red, 112 lb keg.....lb.	.38	.40	.38	.40	.40	.38	.38
Yellow, 500 lb casks.....lb.	.18½	.21	.18½	.21	.21	.18½	.18½
Tartrate Neut, 100 lb keg.....lb.	.21	.21	.21	.21	.21	.21	.51
Titanium Oxalate, 200 lb bbls.....lb.	.21	.23	.21	.23	.23	.21	.21
Propyl Furoate, 1 lb tins.....lb.	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Pumice Stone, lump bags.....lb.	.04	.05	.04	.05	.05	.04	.04
250 lb bbls.....lb.	.04½	.06	.04½	.06	.06	.04½	.04½
Powdered, 350 lb bags.....lb.	.02½	.03	.02½	.03	.03	.02½	.02½
Putty, commercial, tubs.....lb.	.03½	.03½	.03½	.03½	.03½	.03½	.03½
Linseed Oil, kegs.....100 lb.	.05½	.05½	.05½	.05½	.05½	.05½	.05½
Pyridine, 50 gal drums.....gal.	1.50	1.75	1.50	1.75	1.75	1.50	1.50
Pyrites, Spanish cif Atlantic ports bulk.....unit	.13	.13½	.13	.13½	.13	.13½	.13
Quebracho, 35% liquid tks.....lb.	.02½	.04	.02½	.04	.04	.02½	.03
450 lb bbls c-1.....lb.	.03½	.03½	.03½	.03½	.03½	.03½	.03½
35% Bleaching, 450 lb bbl.....lb.	.04½	.05½	.04½	.05½	.04½	.05½	.05½
Solid, 63%, 100 lb bales cif.....lb.	.05	.05½	.05	.05½	.05	.05½	.05½
Clarified, 64%, bales.....lb.	.05	.05½	.05	.05½	.05	.05½	.05½
Quercitron, 51 deg liquid 450 lb bbls.....lb.	.05½	.06	.05½	.06	.06	.05½	.05½
Solid, 100 lb boxes.....lb.	.09½	.13	.09½	.13	.13	.09½	.10
Bark, Rough.....ton	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Ground.....ton	34.00	35.00	34.00	35.00	35.00	34.00	34.00
R Salt, 250 lb bbls wks.....lb.	.40	.44	.40	.44	.45	.40	.44
Red Sanders Wood, grd bbls.....lb.	.18	.18	.18	.18	.18	.18	.18
Resorcinol Tech, cans.....lb.	.90	1.25	.90	1.25	1.25	.90	1.15
Rosin Oil, 50 gal bbls, first run.....gal.	.54	.58	.56	.58	.58	.56	.62
Second run.....gal.	.60	.61	.59	.61	.61	.59	.60

Rosin

Rosins 600 lb bbls 250 lb.....unit

B.....	4.80	4.15	4.95	7.75	5.35	9.25	7.45
D.....	5.50	4.60	5.50	8.00	5.50	9.25	7.70
E.....	5.90	4.85	5.90	8.17	5.52½	9.27	8.30
F.....	6.20	5.05	6.20	8.45	5.55	9.27	8.40
G.....	6.25	5.15	6.25	8.45	5.60	9.45	8.40
H.....	6.30	5.20	6.30	8.55	5.60	9.50	8.40
I.....	6.35	5.25	6.35	8.58	5.62½	9.50	8.40
K.....	6.45	5.40	6.45	8.65	5.62½	9.55	8.45
M.....	6.70	5.65	6.70	8.80	5.65	9.85	8.50
N.....	6.95	6.15	6.95	8.95	6.05	10.30	8.93
WG.....	8.15	7.65	8.15	9.25	6.85	11.30	9.00
WW.....	8.90	8.40	8.90	9.85	7.85	12.30	9.30
Rotten Stone, bags mines.....ton	24.00	20.00	24.00	20.00	18.00	30.00	24.00
Lump, imported, bbls.....lb.	.05	.07	.05	.07	.05	.08	.05
Selected bbls.....lb.	.09	.12	.09	.12	.09	.12	.09
Powdered, bbls.....lb.	.02	.05	.02	.05	.02	.05	.02
Sago Flour, 150 lb bags.....lb.	.04½	.05	.04½	.05	.04½	.05	.04½
Sal Soda, bbls wks.....100 lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Salt Cake, 94-96% o-1 wks.....ton	15.50	19.00	15.50	19.00	24.00	15.50	19.00
Chrome.....ton	14.50	17.00	14.50	17.00	25.00	14.50	17.00
Saltpetre, double retd granular 450-500 lb bbls.....lb.	.06½	.06½	.06½	.06½	.06½	.06½	.06½
Satin, White, 500 lb bbls.....lb.	.01½	.01½	.01½	.01½	.01½	.01½	.01½
Shellac Bone dry bbls.....lb.	.32	.33	.28	.29	.47	.28	.47
Garnet, bags.....lb.	.22	.26	.24	.26	.40	.24	.45
Superfine, bags.....lb.	.20	.22	.19	.22	.39	.20	.47
T. N. bags.....lb.	.18	.20	.17	.34	.18	.44	.36
Schaeffer's Salt, kigs.....lb.	.53	.57	.53	.57	.53	.57	.53
Silica, Crude, bulk mines.....ton	8.00	11.00	8.00	11.00	8.00	11.00	8.00
Refined, floated bags.....ton	22.00	30.00	22.00	30.00	22.00	30.00	22.00
Air floated bags.....ton	32.00	32.00	32.00	32.00	32.00	32.00	32.00
Extra floated bags.....ton	32.00	40.00	32.00	40.00	40.00	40.00	32.00
Soapstone, Powdered, bags f. o. b. mines.....ton	15.00	22.00	15.00	22.00	22.00	15.00	22.00

Soda

Soda Ash, 58% dense, bags c-1 wks.....100 lb.	1.17½	1.17½	1.40	1.40	1.40	1.40	
58% light, bags.....100 lb.	1.15	1.15	1.34½	1.34½	1.34½	1.34	
Contract, bags c-1 wks 100 lb.			1.32	1.32	1.32	1.32	
Soda Caustic, 76% grad & flake drums.....100 lb.	2.90	2.90	3.35	3.00	3.35	3.35	
76% solid drs.....100 lb.	2.50	2.50	2.95	2.90	2.95	2.95	
Sodium Acetate, tech.....450 lb. bbls wks.....lb.	.04½	.05	.04½	.05	.04	.06½	.04
Arsenate, drums.....lb.	.18	.19	.18	.19	.18	.19	.18
Arsenite, drums.....gal.	.50	.75	.50	.75	1.00	.50	.75
Bicarb, 400 lb bbl NY.....100 lb.			2.41	2.41	2.41	2.41	2.41

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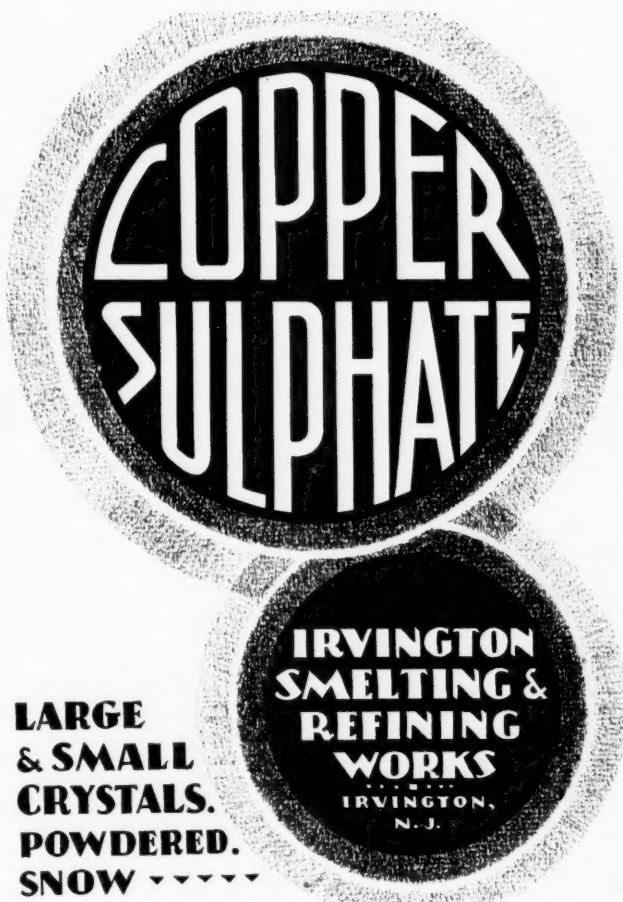
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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

Tin — The metal market fluctuated between very narrow limits during the past month closing fractionally off on the 26th from the price prevailing last month.

Turpentine — Prices were fairly steady during the past month and shipments out of southern ports, specially for export were larger than they have been during the past three months.

Waxes — Promise of an early revival of purchasing and higher prices was forecast by larger withdrawals for both spot and contract customers. Several of the waxes were advanced. Candelilla and all of the grades of Carnauba were specially strong. The direct reason for the increase in the latter was due to the stand of the Brazilian factors who were rejecting all offers based on last month's prices. Beeswax turned bullish in price upon receipt of the news from abroad that the cost of replacements would be higher. The threat of possible curtailment at primary markets forced up the price on candelilla. Imports of vegetable wax into the United States during the period 1928-1930 averaged about 10,200,000 pounds valued at \$2,090,000. Imports in 1930 declined about 12 per cent in quantity and 20 per cent in value as compared with 1929. Carnauba wax imports, which comprised about 70 per cent of the total, increased perceptibly in quantity but suffered a drop in value. Other vegetable waxes declined in both quantity and value. Brazil supplies practically all of the carnauba wax imported into the United States, while Japan and Mexico are the leading sources of other vegetable wax. United States import statistics for vegetable wax follow:

	1929	1930
Carnauba wax:		
Quantity, pounds.....	6,849,300	7,415,600
Value.....	\$1,536,700	\$1,435,400
Average value, pounds.....	\$0.22	\$0.19
Other vegetable waxes:		
Quantity, pounds.....	4,617,700	2,483,000
Value.....	\$723,900	\$339,000
Average value, pounds.....	\$0.16	\$0.14

Zinc — While the price on March 26th was 5c above the ruling quotation at the end of last month it was 5c under the high for March. Demand is very light despite the continuance of the present attractive price level. The statistical position is weakened by the large stock surplus that is being carried over.

Zinc Oxide — The markets for both the imported and domestic grades were steady, despite the fact, that sales were restricted in most instances to replacement of customers' stocks and little buying of a forward nature was in evidence.

Chinawood Oil — Further strengthening in the price structure occurred during

	Current Market	Low	High	High	Low	High	Low
Bichromate, 500 lb bbls wks. lb.	.07	.07	.07	.07	.07	.07	.07
Bisulfite, 500 lb bbl wks. lb.	.04	.04	.04	.04	.04	.04	.04
Carb. 400 lb bbls NY. 100 lb.	2.30	2.30	2.30	2.30	2.30	1.35	1.30
Chlorate, wks. lb.	.05	.05	.05	.05	.05	.11	.06
Chloride, technical, ton	12.00	13.00	12.00	13.00	13.00	12.00	12.00
Cyanide, 96-98%, 100 & 250 lb drums wks. lb.	.16	.17	.16	.17	.20	.16	.18
Fluoride, 300 lb bbls wks. lb.	.08	.08	.08	.08	.09	.08	.08
Hydroxide, 200 lb bbls f. o. b. wks. lb.	.22	.24	.22	.24	.24	.24	.22
Hypochlorite solution, 100 lb cys. lb.	.05	.05	.05	.05	.05	.05	.05
Hyposulfite, tech. pea cys. 375 lb bbls wks. 100 lb.	2.40	3.00	2.40	3.00	3.00	3.05	2.50
Technical, regular crystals 375 lb bbls wks. 100 lb.	2.50	2.65	2.50	2.65	2.65	2.65	2.40
Metanilate, 150 lb bbls. lb.	.44	.45	.44	.45	.44	.45	.45
Monohydrate, bbls. lb.	.02	.02	.02	.02	.02	.02	.02
Naphthionate, 300 lb bbl. lb.	.52	.54	.52	.54	.57	.52	.54
Nitrate, 92%, crude, 200 lb bags c-1 NY. 100 lb.	2.07	2.02	2.07	2.22	1.99	2.22	2.09
Nitrite, 500 lb bbls spot. lb.	.07	.08	.07	.08	.07	.08	.07
Orthochlorotoluene, sulfonate, 175 lb bbls wks. lb.	.25	.27	.25	.27	.25	.27	.25
Oxalate Neut, 100 lb kegs. lb.	.37	.42	.37	.42	.37	.42	.37
Perborate, 275 lb bbls. lb.	.18	.20	.18	.20	.18	.22	.18
Phosphate, di-sodium, tech. 310 lb bbls. 100 lb.	2.55	3.00	2.55	3.00	3.25	3.55	3.25
tri-sodium, tech. 325 lb bbls. 100 lb.	3.15	3.50	3.15	3.50	4.00	4.00	3.90
Picramate, 100 lb kegs. lb.	.69	.72	.69	.72	.69	.72	.69
Prussiate, Yellow, 350 lb bbl wks. lb.	.11	.12	.11	.12	.11	.12	.12
Pyrophosphate, 100 lb keg. lb.	.15	.20	.15	.20	.15	.20	.15
Silicate, 60 deg 55 gal drs, wks 100 lb.	1.65	1.65	1.65	1.65	1.65	1.65	1.65
40 deg 55 gal drs, wks 100 lb.	.75	1.00	.75	1.00	.80	.80	.70
Silicofluoride, 450 lb bbls NY. lb.	.04	.04	.04	.04	.05	.04	.05
Stannate, 100 lb drums. lb.	.23	.26	.23	.26	.43	.24	.38
Stearate, bbls. lb.	.20	.25	.20	.25	.29	.20	.25
Sulfanilate, 400 lb bbls. lb.	.16	.18	.16	.18	.18	.16	.16
Sulfate Anhyd, 550 lb bbls c-1 wks. lb.	.02	.02	.02	.02	.02	.02	.02
Sulfide, 80% crystals, 440 lb bbls wks. lb.	.02	.02	.02	.02	.02	.02	.02
62% solid, 650 lb drums 1c-1 wks. lb.	.03	.03	.03	.03	.03	.04	.03
Sulfite, crystals, 400 lb bbls wks. lb.	.03	.03	.03	.03	.03	.03	.03
Sulfocyanide, bbls. lb.	.28	.35	.28	.35	.35	.28	.28
Tungstate, tech, crystals, kegs lb.	.81	.88	.81	.88	.88	1.40	.88
Solvent Naphtha, 110 gal drs wks. lb.	.30	.38	.30	.38	.40	.30	.35
Spruce, 25% liquid, bbls. lb.	.01	.01	.01	.01	.01	.01	.01
25% liquid, tanks wks. lb.	.01	.01	.01	.01	.01	.01	.01
50% powd, 100 lb bag wks lb.	.02	.02	.02	.02	.02	.02	.02
Starch, powd., 140 lb bags 100 lb.	2.92	2.92	3.20	4.02	3.42	4.12	3.82
Pearl, 140 lb bags. 100 lb.	2.82	2.82	3.00	3.92	3.32	4.02	3.72
Potato, 200 lb bags. lb.	.05	.06	.05	.06	.05	.06	.05
Imported bags. lb.	.05	.06	.05	.06	.05	.06	.05
Soluble. lb.	.08	.08	.08	.08	.08	.08	.08
Rice, 200 lb bbls. lb.	.09	.10	.09	.10	.09	.10	.09
Wheat, thick bags. lb.	.06	.07	.06	.07	.06	.07	.06
Thin bags. lb.	.09	.10	.09	.10	.09	.10	.09
Strontium carbonate, 600 lb bbls wks. lb.	.07	.07	.07	.07	.07	.07	.07
Nitrate, 600 lb bbls NY. lb.	.09	.09	.09	.09	.09	.09	.08
Peroxide, 100 lb drs. lb.	1.25	1.25	1.25	1.25	1.25	1.25	1.25

Sulfur

Sulfur Brimstone, broken rock, 250 lb bag c-1. 100 lb.	2.05	2.05	2.05	2.05	2.05	2.05	2.05
Crude, f. o. b. mines. ton	18.00	19.00	18.00	19.00	19.00	18.00	18.00
Flour for dusting 99 1/2%, 100 lb bags c-1 NY. 100 lb.	2.40	2.40	2.40	2.40	2.40	2.40	2.40
Heavy bags c-1. 100 lb.	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Flowers, 100%, 155 lb bbls c-1 NY. 100 lb.	3.45	3.45	3.45	3.45	3.45	3.45	3.45
Roll, bbls 1c-1 NY. 100 lb.	2.65	2.85	2.65	2.85	2.85	2.85	2.65
Sulfur Chloride, red, 700 lb drs wks. lb.	.05	.05	.05	.05	.05	.05	.05
Yellow, 700 lb drs wks. lb.	.03	.04	.03	.04	.03	.04	.03
Sulfur Dioxide, 150 lb cys. lb.	.07	.07	.07	.07	.07	.08	.07
Extra, dry, 100 lb cys. lb.	.12	.12	.12	.12	.10	.19	.10
Sulfuryl Chloride. lb.	.15	.40	.15	.40	.65	.65	.10
Talc, Crude, 100 lb bgs NY. ton	12.00	15.00	12.00	15.00	15.00	12.00	12.00
Refined, 100 lb bgs NY. ton	16.00	18.00	16.00	18.00	18.00	16.00	16.00
French, 220 lb bags NY. ton	18.00	22.00	18.00	22.00	18.00	25.00	18.00
Refined, white, bags. ton	35.00	40.00	35.00	40.00	35.00	45.00	35.00
Italian, 220 lb bags NY. ton	40.00	50.00	40.00	50.00	50.00	50.00	40.00
Refined, white, bags. ton	50.00	55.00	50.00	55.00	50.00	55.00	50.00
Superphosphate, 16% bulk, wks. ton	8.00	9.00	8.00	9.00	9.50	8.00	9.00
Triple bulk, wks. unit	.65	.65	.65	.65	.65	10.00	9.00
Tankage Ground NY. unit	2.65	2.75	3.20	4.00	3.20	4.50	4.00
High grade f.o.b. Chicago. unit	2.90	3.00	3.25	3.85	3.25	4.80	3.75
South American cif. unit	3.10	3.20	3.40	4.25	3.40	5.00	4.35
Tapioca Flour, high grade bgs. lb.	.03	.05	.03	.05	.03	.05	.04
Medium grade, bags. lb.	.03	.04	.03	.04	.02	.04	.03
Tar Acid Oil, 15% drums. gal.	.24	.25	.24	.25	.24	.27	.26
25% drums. gal.	.26	.28	.26	.28	.30	.30	.29



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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

the past month specially on futures but buyers were limiting purchases strictly to immediate requirements so that the advance was little more than a nominal increase. Hong Kong is the principal outlet for tung oil exported from South China. Official statistics showing exports have been available only since April 1, 1930. Shipments of tung oil from Hong Kong during the 9-month period April to December, 1930, to all countries amounted to approximately 4,725,000 pounds, valued at \$405,000. Of total shipments from Hong Kong, the United States took about 60 per cent, the rest being shipped mainly to European markets.

Cocoanut Oil -- Conditions locally and on the Pacific Coast showed some signs of firmness and less evidence of shading on actual sales. Slight improvement in actual tonnages moved caused some speculative trading as this was taken as an indication that stocks were lower.

Cod Oil -- A larger number of inquiries were in the market but little improvement in actual volume of sales was in evidence. Factors were holding to published prices.

Copra -- A decided firmness characterized the market in this commodity during the last ten days of the month, reflecting firmer conditions abroad in primary markets.

Corn Oil -- Despite the continued unsettlement in the grain market, producers of the crude were firm in their attitude towards prices for future and spot deliveries. Stocks in the hands of jobbers are lower than they have been in several months and a further impetus to buying is expected momentarily from this quarter. While the price structure was firm no advance was made in published quotations.

Cottonseed Oil -- Trading was again restricted to moderately small lots while prices although irregular at times showed a general tendency to go to higher levels.

Grease -- More actively characterized the situation in the local market. Several sales involving fairly large size tonnages were reported and a number of inquiries were going the rounds as the month closed.

Linseed Oil -- Quotations moved during the month in very narrow limits, and the published quotations remained unchanged. However, a slightly weakened tone was noticed near the end of the month and concessions were being rather freely offered.

Menhaden Oil -- While buyers were exhibiting only a mild interest in purchases either for spot or future delivery the market held to the firm tone in evidence last month. Actual sales were smaller than those consummated in February.

	Current Market	Low	High	High	Low	High	Low
Terra Alba Amer. No. 1, bgs or bbls mills. 100lb.	1.15	1.75	1.15	1.75	1.75	1.15	1.75
No. 2 bags or bbls. 100lb.	1.50	2.00	1.50	2.00	2.00	1.50	2.00
Imported bags. 100lb.	.01	.01	.01	.01	.01	.01	.01
Tetrachlorethane, 50 gal drs. 100lb.	.09	.09	.09	.09	.09	.09	.09
Tetralene, 50 gal drs wks. 100lb.	.20	.20	.20	.20	.20	.20	.20
Thiocarbamid, 170 lb bbl. 100lb.	.26	.28	.26	.28	.28	.22	.24
Tin Bichloride, 50% soln, 100 lb bbls wks. 100lb.	.12	.12	.12	.12	.12	.14	.13
Crystalline, 500 lb bbls wks. 100lb.	.26	.27	.25	.28	.34	.25	.38
Metal Strains NY. 100lb.	.26	.27	.25	.27	.38	.26	.48
Oxide, 300 lb bbls wks. 100lb.	.25	.29	.25	.29	.42	.25	.56
Tetrachloride, 100 lb drs wks. 100lb.	.19	.19	.18	.19	.20	.18	.30
Titanium Dioxide 300 lb bbl. 100lb.	.21	.22	.21	.22	.50	.21	.50
Pigment, bbls. 100lb.	.06	.07	.06	.07	.07	.06	.14
Toluene, 110 gal drs. 100lb.	.34	.34	.34	.34	.40	.35	.45
8000 gal tank cars wks. 100lb.	.28	.30	.28	.30	.35	.30	.40
Toluidine, 350 lb bbls. 100lb.	.90	.94	.90	.94	.94	.90	.94
Mixed, 900 lb drs wks. 100lb.	.27	.32	.27	.32	.32	.27	.32
Toner Lithol, red, bbls. 100lb.	.90	.95	.90	.95	.95	.90	.95
Para, red, bbls. 100lb.	.80	.80	.80	.80	.80	.80	.80
Toluidine. 100lb.	1.50	1.55	1.50	1.55	1.55	1.50	1.55
Triacetin, 50 gal drs wks. 100lb.	.32	.36	.32	.36	.36	.32	.36
Trichlorethylene, 50 gal dr. 100lb.	.10	.10	.10	.10	.10	.10	.10
Triethanolamine, 50 gal drs. 100lb.	.40	.42	.40	.42	.42	.40	.60
Triethyl Phosphate, drs. 100lb.	.33	.45	.33	.45	.45	.33	.45
Triphenyl guanidine. 100lb.	.58	.60	.58	.60	.60	.58	.70
Phosphate, drums. 100lb.	.60	.70	.60	.70	.70	.60	.75
Tripoli, 500 lb bbls. 100lb.	.75	2.00	.75	2.00	2.00	1.75	2.00
Tungsten, Wolframite, per unit 11.25	11.75	11.75	11.25	11.75			
Turpentine carlots, bbls. 100lb.	.54	.56	.54	.56	.61	.41	.65
Wood Steam dist. bbls. 100lb.	.51	.61	.47	.61	.52	.36	.57
Urea, pure, 112 lb cases. 100lb.	.15	.17	.15	.17	.17	.15	.30
Fert. grade, bags c.i.f. ton	108.00	108.00	108.00	108.00	108.00	105.00	98.00
c. i. f. S. points. ton	109.30	109.30	109.30	109.30	109.30	106.30	99.30
Valonia Beard, 42% tannin bags. 100lb.	40.00	40.00	40.00	40.00	39.50	55.00	42.00
Cups, 30-31% tannin. ton	24.00	25.00	24.00	25.00	27.00	24.00	35.00
Mixture, bark, bags. 100lb.	30.00	31.00	30.00	31.00	32.50	30.00	43.00
Vermillion, English, kegs. 100lb.	1.75	1.80	1.75	1.80	2.05	1.75	2.05
Vinyl Chloride, 16 lb cyl. 100lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Wattle Bark, bags. 100lb.	39.00	41.00	39.00	41.00	47.75	40.00	49.75
Extract 55%, double bags ex-dock. 100lb.	.05	.06	.05	.06	.06	.05	.06
Whiting, 200 lb bags, c-1 wks 100lb.	1.00	1.00	1.00	1.00	1.00	1.25	1.00
Alba, bags c-1 NY. ton	13.00	13.00	13.00	13.00	13.00	13.00	13.00
Gilders, bags c-1 NY. 100lb.	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Xylene, 10 deg tanks wks. gal.	.28	.28	.28	.28	.31	.28	.33
Commercial, tanks wks. gal.	.25	.30	.25	.30	.33	.25	.32
Xylidine, crude. 100lb.	.37	.37	.37	.38	.37	.38	.38

Zinc

Zinc Ammonium Chloride powd., 400 lb bbls. 100lb.	5.25	5.75	5.25	5.75	5.75	5.25	5.75	5.25
Carbonate Tech, bbls NY. 100lb.	.10	.11	.10	.11	.11	.10	.11	.10
Chloride Fused, 600 lb drs. wks. 100lb.	.05	.06	.05	.06	.06	.05	.06	.05
Gran., 500 lb bbls wks. 100lb.	.05	.06	.05	.06	.06	.05	.06	.05
Soln 50%, tanks wks. 100lb.	2.25	3.00	2.25	3.00	3.00	2.25	3.00	3.00
Cyanide, 100 lb drums. 100lb.	.38	.39	.38	.39	.41	.38	.41	.40
Dithiofuroate, 100 lb dr. 100lb.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Dust, 500 lb bbls c-1 wks. 100lb.	.06	.07	.06	.07	.11	.06	.08	.08
Metal, high grade slabs c-1 NY. 100lb.	4.30	4.45	4.35	4.45	6.45	4.10	6.45	6.45
Oxide, American bags wks. 100lb.	.06	.07	.06	.07	.07	.06	.07	.07
French, 300 lb bbls wks. 100lb.	.09	.11	.09	.11	.11	.09	.11	.09
Perborate, 100 lb drs. 100lb.	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Peroxide, 100 lb drs. 100lb.	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Stearate, 50 lb bbls. 100lb.	.19	.22	.19	.23	.26	.20	.26	.25
Sulfate, 400 bbl wks. 100lb.	.03	.03	.03	.03	.03	.03	.03	.03
Sulfide, 500 lb bbls. 100lb.	.16	.16	.16	.16	.32	.16	.32	.30
Sulfocarbonate, 100 lb keg. 100lb.	.28	.30	.28	.30	.30	.28	.30	.28
Zirconium Oxide, Nat. kegs. 100lb.	.02	.03	.02	.03	.03	.02	.03	.02
Pure kegs. 100lb.	.45	.50	.45	.50	.50	.45	.50	.45
Semi-refined kegs. 100lb.	.08	.10	.08	.10	.10	.08	.10	.08

Oils and Fats

Castor, No. 1, 400 lb bbls. 100lb.	.11	.12	.11	.12	.13	.11	.13	.13
No. 3, 400 lb bbls. 100lb.	.11	.11	.11	.11	.13	.11	.13	.12
Blown, 400 lb bbls. 100lb.	.13	.14	.13	.14	.15	.12	.15	.14
China Wood, bbls spot NY. 100lb.	.07	.07	.07	.07	.13	.07	.16	.14
Tanks, spot NY. 100lb.	.06	.07	.06	.07	.11	.06	.15	.13
Coast, tanks. 100lb.	.06	.06	.05	.06	.10	.05	.14	.12
Cocoanut, edible, bbls NY. 100lb.	.10	.10	.10	.10	.10	.10	.10	.10
Ceylon, 375 lb bbls NY. 100lb.	.06	.06	.06	.06	.08	.06	.09	.07
8000 gal tanks NY. 100lb.	.05	.05	.05	.05	.07	.05	.08	.06
Cochin, 375 lb bbls NY. 100lb.	.06	.07	.06	.07	.09	.07	.10	.09
Tanks NY. 100lb.	.05	.05	.05	.05	.08	.07	.09	.08
Manila, bbls NY. 100lb.	.06	.07	.06	.07	.08	.06	.09	.07
Tanks NY. 100lb.	.05	.05	.04	.05	.07	.05	.08	.06
Tanks, Pacific Coast. 100lb.	.04	.04	.04	.05	.07	.05	.08	.06

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Purchasing Power of the Dollar: 1926 Average—\$1.00 - 1930 Average \$1.161 - Jan. 1930 \$1.072 - March 1931 \$1.327

Mustard Oil — A fair demand coupled with only a fair amount of immediately available stock held the market for mustard in a very firm position at prices unchanged from last month.

Neatsfoot Oil — Restriction of buying continued to unsettle the market and further concessions failed to increase the interest of consumers in making future commitments.

Oleo Oil — Higher prices for raw material brought about a slight strengthening in the market for refined.

Olive Oil — The market in this commodity was much firmer upon receipt of cables from Italy advising that the final crop figures for 1930 would show almost a fifty per cent decrease from the previous year. Demand from the soap industry for foots was decidedly better.

Palm Oil — Carried along by generally firmer conditions in the vegetable oil markets this item was quoted at $\frac{1}{8}$ c to $\frac{1}{4}$ c higher at the close of March over February prices.

Perilla Oil — Perilla did not join the general advance in prices. Buyers were unwilling to assume commitments in advance preferring to await further developments before contracting ahead for any length of time.

Rapeseed Oil — While demand from consumers was light the scarcity of available stocks in the local market aided in maintaining prices at last month's levels.

Red Oil — Conditions did not change from last month. Sales and inquiries were reported as being slightly more encouraging.

Soybean Oil — Both domestic and imported were in normal demand and prices remained firm throughout the entire month.

Stearic Acid — With raw material higher, the refined prices ruled higher. Better interest in spot and future deliveries brought about a very steady tone to the market.


Tallow — A rather active demand developed in the local market during the last half of the month and spot stocks were reduced. Prices ruled at slightly higher levels due to the increased demand.

Whale Oil — Prices remained firm during the month while the demand showed signs of further improvement. While the immediate future price trend would appear to be upward, the remarks of the president of one of the largest producers, Anglo-Norwegian Holdings, Ltd., on the occasion of the annual meeting of the company in Montreal, were not very optimistic over 1932.

	Current Market	1931		1930		1929	
		Low	High	Low	High	Low	High
Cod, Newfoundland, 50 gal bbls							
Tanks NY.....gal.	.41	.44	.41	.44	.56	.46	.64
Cod Liver see Chemicals.....gal.	.39	.40	.39	.40	.62	.48	.60
Copra, bags.....lb.	.0275	.0275	.0255	.0325	.046	.039	.051
Corn, crude, bbls NY.....lb.		.09		.09	.10	.081	.101
Tanks, mills.....lb.	.071	.071	.07	.071	.08	.061	.091
Refined, 375 lb bbls NY.....lb.	.101	.101	.101	.101	.101	.091	.111
Tanks.....lb.	.081	.081	.081	.081	.10	.08	.11
Cottonseed, crude, mill.....lb.	.061	.07	.061	.07	.071	.061	.091
PSY 100 lb bbls spot.....lb.	.08	.09	.074	.09	.088	.076	.1075
Mar.....lb.		.0748					
Degras, American, 50 gal bbl							
NY.....lb.	.041	.041	.04	.041	.041	.031	.05
English, brown, bbls NY.....lb.	.041	.05	.041	.05	.05	.041	.051
Light, bbls NY.....lb.	.05	.051	.05	.051	.051	.05	.051
Dog Fish, Coast Tanks.....gal.		.32		.32	.34	.32	
Greases							
Greases, Brown.....lb.	.041	.041	.031	.041	.061	.04	.081
Yellow.....lb.	.041	.05	.03	.05	.071	.031	.081
White, choice bbls NY.....lb.	.051	.051	.05	.051	.081	.06	.111
Herring, Coast, Tanks.....gal.		Nom.		Nom.			
Horse, bbls.....lb.	.051	Nom.	.051	Nom.	Nom.	.051	Nom.
Lard Oil, edible, prime.....lb.	.121	.13	.121	.13	.131	.121	.151
Extra, bbls.....lb.	.09	.10	.09	.10	.12	.10	.131
Extra No. 1, bbls.....lb.	.081	.091	.081	.091	.11	.091	.131
Linseed, Raw, five bbl lots.....lb.	.098	.102	.096	.102	.146	.096	.162
Bbls c-1 spot.....lb.	.094	.098	.092	.098	.142	.092	.158
Tanks.....lb.	.088	.092	.086	.092	.134	.086	.15
Menhaden Tanks, Baltimore.....gal.	.21	.22	.21	.22	.50	.21	.52
Blown, bbls NY.....lb.	.071	.08	.071	.08	.09	.071	.09
Extra, bleached, bbls NY.....gal.	.47	.49	.52	.53	.70	.52	.70
Light, pressed, bbls NY.....gal.	.36	.38	.36	.38	.64	.36	.64
Yellow, bleached, bbls NY.....gal.	.39	.41	.38	.40	.67	.38	.67
Mineral Oil, white, 50 gal bbls							
.....gal.	.40	.60	.40	.60	.60	.40	.60
Russian, gal.....gal.	.95	1.00	.95	1.00	1.00	.95	1.00
Neatsfoot, CT, 20° bbls NY.....lb.	.15	.16	.15	.16	.171	.161	.19
Extra, bbls NY.....lb.	.081	.10	.081	.10	.111	.091	.131
Pure, bbls NY.....lb.	.101	.12	.101	.12	.131	.111	.151
Oleo, No. 1, bbls NY.....lb.	.071	.08	.071	.08	.121	.081	.111
No. 2, bbls NY.....lb.	.061	.08	.061	.08	.11	.081	.111
No. 3, bbls NY.....lb.	.08	.09	.08	.09	.101	.09	.101
Olive, denatured, bbls NY.....gal.	.82	.85	.82	.85	1.00	.70	1.05
Edible, bbls NY.....gal.	1.75	2.00	1.75	2.00	2.00	1.75	2.00
Foots, bbls NY.....lb.	.061	.061	.061	.061	.08	.06	.111
Palm, Kernel, Casks.....lb.	.06	.061	.051	.061	.081	.06	.09
Lagos, 1500 lb casks.....lb.	.05	.06	.05	.06	.071	.051	.09
Niger, Casks.....lb.	.041	.051	.041	.051	.071	.051	.081
Peanut, crude, bbls NY.....lb.		Nom.		Nom.	Nom.		Nom.
Refined, bbls NY.....lb.	.12	.14	.12	.14	.15	.12	.15
Perilla, bbls NY.....lb.	.09	.11	.09	.11	.141	.10	.20
Tanks, Coast.....lb.	.061	.07	.061	.09	.111	.08	.151
Poppyseed, bbls NY.....gal.	1.70	1.75	1.70	1.75	1.75	1.70	1.70
Rapeseed, blown, bbls NY.....gal.	.71	.73	.71	.73	1.00	.74	1.04
English, drms. NY.....gal.		.75		.75	.82	.75	.90
Japanese, drms. NY.....gal.	.56	.58	.56	.58	.70	.56	.88
Red, Distilled, bbls.....lb.	.081	.09	.081	.09	.101	.081	.111
Tank.....lb.	.071	.081	.071	.081	.091	.071	.101
Salmon, Coast, 8000 gal tks.....gal.		.22		.22	.44	.42	.44
Sardine, Pacific Coast tks.....gal.	.18	.19	.18	.19	.42	.18	.51
Sesame, edible, yellow, dos.....lb.	.091	.101	.091	.101	.12	.09	.12
White, dos.....lb.		.10		.10	.121	.10	.121
Sod, bbls NY.....gal.		.40		.40	.40	.40	.40
Soy Bean, crude.....lb.							
Pacific Coast, tanks.....lb.	.07	.08	.07	.08	.091	.07	.101
Domestic tanks, f.o.b. mills,.....lb.							
Crude, bbls NY.....lb.	.065	.07	.065	.07	.081	.07	.101
Tanks NY.....lb.	.073	.08	.073	.08	.101	.10	.121
Refined, bbls NY.....lb.	.074	.08	.074	.08	.091	.09	.111
Sperm, 38° CT, bleached, bbls NY.....lb.	.84	.85	.84	.85	.85	.84	.85
45° CT, bleached, bbls NY.....gal.	.79	.80	.79	.80	.80	.79	.80
Stearic Acid, double pressed dist bags.....lb.	.091	.11	.091	.11	.15	.131	.181
Double pressed saponified bags.....lb.							
Triple, pressed dist bags.....lb.	.101	.12	.101	.12	.151	.141	.19
Stearine, Oleo, bbls.....lb.	.12	.14	.12	.14	.17	.151	.201
Tallow City, extra loose.....lb.	.09	.081	.081	.081	.091	.081	.12
Edible, tierces.....lb.	.041	.04	.031	.04	.071	.041	.081
Tallow Oil, Bbls, c-1 NY.....lb.	.051	.05	.041	.06	.091	.051	.10
Acidless, tanks NY.....lb.	.071	.081	.071	.081	.11	.081	.12
Vegetable, Coast mats.....lb.	.06	.09	.061	.09	.10	.081	.11
Turkey Red, single bbls.....lb.	.09	.10	.09	.10	.12	.10	.12
Double, bbls.....lb.	.10	.12	.10	.12	.16	.13	.16
Whale, bleached winter, bbls NY.....gal.		.74		.74	.74	.74	.80
Extra, bleached, bbls NY.....gal.	.77	.771	.77	.771	.76	.76	.82
Nat. winter, bbls NY.....gal.	.71	.72	.71	.72	.73	.73	.78

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CASTINGS --- CONSTRUCTIONS
and MACHINING of
MONEL METAL PURE NICKEL
CHROME-NICKEL IRONS
BRONZE  SILVER
SHOLES INCORPORATED
182 Lafayette St. New York

PFIZER

ESTABLISHED 1849

CITRIC ACID AND CITRATES

CHAS. PFIZER & CO. INC.
MANUFACTURING CHEMISTS
EST 1849
81 MAIDEN LANE NEW YORK, N. Y. 444 W. GRAND AVE CHICAGO, ILL.

"We"—Editorially Speaking

The Chemical Exposition will be here before we again reach you. In fact the May number of **CHEMICAL MARKETS** will appear coincident with the Exposition. We collectively will be on hand, and trust that you will avail yourself of our cordial invitation to make yourself known at Booth Number 28 (main floor) and to appropriate pen, paper, ink, stamps, or to just sit down and rest. We are holding open house and anticipate the pleasure of meeting you personally.

Without consciously attempting to do so we have made potash the predominating feature of this issue. In the first place, Professor George W. Stocking continues his very valuable contribution to the literature on the potash situation, past, present and future, dealing with the possibility of lifting the present dependence of this country on foreign sources of supply. He stresses in this particular number the commercial possibilities prevailing in the Permian Basin of the Southwest. The leading news story of the month deals with the announcement of Borax Consolidated, Ltd., that it has acquired, through its American subsidiary, The Pacific Coast Borax Co. a substantial interest in American potash development. Finally, we sadly record the passing of Dr. John E. Teeple, whose greatest contribution to this country was to awaken an interest in our unenviable position in potash, and who during the War devoted his untiring energy and ability to supplying this needed sinew of both peace and war.

We are now facing a new decade. Naturally one's thoughts turn to the question, What are the future trends in the industries developed in the last decade? We owe in a great measure the stupendous growth of the chemical industry, in the last ten years to the commercial introduction of synthetic yarns, plastics and lacquer. As large consumers of the raw chemical commodities, they have proven sufficient cause for the erection of larger chemical plants and increased production. Dependent then as we are in such a large measure to their growth, we feel that we should review at this time these industries, placing special emphasis on their future relationship with the industrial or heavy chemical field. We have turned to the leading textile chemist of the South and the one responsible for many of the improvements in the manufacture of synthetic yarns, Dr. Charles E. Mullin. He is peculiarly fitted for the job of presenting the synthetic yarn story to **CHEMICAL MARKETS** readers.

BY-PRODUCTS

The town of Ryan is to be only a memory. Borax works there in the desert have been shut down because of superior material elsewhere and railroad tracks connecting the town with the outside world are to be removed. The town overlooks Death Valley. Merely an item of obsolescence on the books of some borax producer.

MAY

Chemical Exposition Number

"The history of The Growth of The Chemical Exposition." An interview with Charles F. Roth, Co-Manager of the 13th Exposition and Director of the past twelve. A vivid picture of the development of a chemical industry in America.

"The Educational Value of The Chemical Exposition," by Professor W. T. Read, of Rutgers University. How does the chemical manufacturer and producer of equipment benefit from the instruction of the future leaders of the industry?

"Highlights of the 1931 Exposition." A staff review of the most interesting developments in the chemical and process industries to be found at the 13th Exposition.

"Wood Preservation." P. R. Hicks of the National Lumber Manufacturer's Association describes the best chemical methods for the treatment of lumber.

Professor George W. Stocking concludes his series of articles on Potash. Dr. Charles E. Mullin continues his review of the Synthetic Yarn Industry.

In the Plant Management Section, L. Staniforth on, "Cost Accounting in The Chemical Industry," Robert H. Ferguson, Safety Engineer, National Safety Council, "Safety in The Handling of Compressed Gases," E. H. deConigh, "Blowing Bulk Chemicals About the Plant."

Does a patent really protect? The patent situation has been the cause for serious debate for many years. Do our present laws offer sufficient protection to the chemical manufacturer so that he may with perfect safety tell truthfully what he is attempting to patent? Should he rather depend on secrecy and deception in his plant. Dr. Rossman has made a very interesting study of this situation and presents the views of a large number of directors of research.

What is one man's meat is another man's poison. A recent number of the Wall St. Journal contained a news item indicating the savings to the leading soap manufacturers derived from the lower alkali and vegetable oil prices now prevailing. Reading a little between the lines it is not difficult to see that it is ultimately the producer of the raw commodities that is most often left holding the bag in times of depression. We do not notice particularly that our favorite brand of anti "B. O." is quoted at cheaper prices. But where then does the savings go that are affected on such raw commodities as caustic and palm oil? Perhaps that is the answer to the lack of an "unemployment problem" at the P & G plants.

Continuing our rather informal discussion of a few months ago on the improvement registered in the last few years in trade paper advertising, we note with pleasure the editorial remarks on the subject in "*The India Rubber World*". "The advertiser who gladdens the publisher of a trade paper is he who makes his announcements in it as impressive as the expensive displays he makes in a magazine with a million circulation. Advertising in a trade paper pays well, but it requires proper preparation to get best results. Since it is worth doing, it is worth doing well."

Chemical companies are becoming air-minded with the fertilizer companies leading the procession. We find the entertainment afforded by the Pacific Coast Borax Co., The Barrett Co.'s Arcadians and the Swift's Garden Hour quite comparable with the best in radio broadcasting and well worth tuning in on. The fertilizer companies are rapidly working out their own solution without much help from Washington. A thorough understanding of the modern methods of merchandising is worth a lot more than all the legislative effort of a house-full of congressmen.